

C 111079

JPRS-ELS-87-007

30 JANUARY 1987

# Europe/Latin America Report

SCIENCE AND TECHNOLOGY

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30 JANUARY 1987

## EUROPE/LATIN AMERICA REPORT

### SCIENCE AND TECHNOLOGY

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## WEST EUROPE/AEROSPACE

### ITALY'S Ciset SPACE PROGRAMS

Rome AVIATION in Italian Jun 86 pp 313-316

[Interview with Engr Alberico Pellacchia, general manager of Ciset by Antonio Bruno; place and date of interview not given]

[Text] Ciset [Italian Technical Services Company] is one of the most prestigious of the Italian private-sector's firms that, since 1958, have been operating in the electronics field,. A few years ago, Ciset made its entry also in the space sector--in the remote-sensing field in particular. With a view to learning more about this new business activity in which this firm, which is located on Via Salaria, at the gates of the capital, is actively and successfully engaged, we interviewed its general manager, Engr Alberico Pellacchia.

[Question] What can you tell us regarding Ciset's plans for the future, and in particular with respect to your company's activities in the space sector?

[Answer] As you probably know, we are presently engaged in an activity that is diversified from that of past years but that is closely connected with the experience we have acquired and developed in the course of all these years.

Ciset is well-known as a services company whose principal activity is centered on servicing air traffic control systems and radio navigational aid systems. The furnishing of this type of services is a rather demanding task, considering that flight safety and regularity are dependent on it. All of this requires a particularly high level of training and skill on the part of our personnel, as regards both the technical and operational aspects.

Ciset presently employs 900 persons, all holders of diplomas or university degrees. For many years now, we have been granting scholarships to carefully selected personnel, enabling them to take company in-house courses, upon successful completion of which they can be hired and gradually brought into the operational life of the company. And thanks to this policy of selection and training, we have achieved extremely satisfying results in terms of the technical efficiency of the installations connected with air traffic control. In this regard, we have received numerous acknowledgements of this fact, one

of them being an evaluation by the FAA, which a few years ago conducted a survey for the Air Force.

Contributing to these results is the systematic application--by our technical personnel--of carefully designed and developed rules and procedures, whose implementation is a basic function of the high responsibility attached to the furnishing of the services provided by Ciset, which could become involved, by way of its activity, in the event of an unfortunate accident.

In addition to the maintaining of installations, I should point out also the technical improvements and upgrading which our firm proposes and carries out for the account of its clients. Significant in this regard is the realization of the remote control and remote check-out systems that have been operational since 1 January of this year. These systems enable the remote checking out and control of radio aids to air navigation. Currently, 19 stations have now been automated and are no longer staffed by technicians; and this, as is well known, has resulted in sizable operating economies for the AAVTAG. In actual fact, over a period of 5 months, all the objectives the AAVTAG had set for itself have been met. No decline of any kind in the technical efficiency of the installations has occurred, nor have there been any repercussions on the regularity and safety of air traffic, that could be attributed to this important innovation by Ciset.

The extending of our know-how into the sphere of the ESA [European Space Agency] followed as a natural thing; and thus, 4 years ago now, Ciset was awarded, on the basis of an international competition, the complete operation of the Redu Satellite Center in Belgium. The results to date, in terms of technical and operational efficiency, have been declared by the ESA to be "highly satisfactory." This first contract has been followed by others, all of them on the basis of competitive international bids; and today, Ciset provides assistance to the ESA Space Operations Center at Darmstadt and to the Esrin Information Retrieval Center at Frascati. Ciset engineers and technicians are also present at Estec in Holland, to provide assistance to the Satellite Check-Out Stations. Another group of engineers is working with ESOC in Germany on the Columbus program.

I should point out, however, that in some of these important activities, we are collaborating with or grouped with other European firms such as, for example, RCA, Fokker, Elekluff and Sodeteg. Obviously, this depends on the need there may be to complement one's own capabilities in the European ambit so as to best respond to one's contractual undertakings.

[Question] It is "highly fashionable" today for the various national and international industries to enter into joint ventures in the field of high technology, as, for example, in the aerospace sector.

Thus, what agreements and potential understandings does Ciset have in mind entering into with other similar companies or firms at the European or national level?

[Answer] We are now working as part of three consortiums that have already been formed: The Ciset-MARCONI consortium, dedicated to airport activities; the Ciset-ACS consortium, in which our company participates in the field of image processing; and Naviation International, together with the Philips and Face Standard firms, in which Ciset has responsibility for logistical assistance to the well-known MLS landing systems.

[Question] May we talk about Ciset's activities in the field of so-called smart systems?

[Answer] We can't talk about smart systems, which have a precise definition, but in the sector of advanced data-processing we have long since designed and built a center of our own, in which we have invested financial resources, above all insofar as concerns research on software as well as hardware.

One of our more recent realizations--(Engr Pellacchia emphasized this)--is a software designed for the processing of images and of the relative ad hoc center. In this regard, we have already been awarded a number of contracts with stimulating technical objectives which keep us from losing the advantage of the know-how that we feel we have gained over potential competition. However, having no particular subsidies for this type of activity, we have to exercise a great deal of care in selecting commitments high in advanced and innovative content.

[Question] Can you tell us whether Ciset has received offers involving collaboration with or participation in consortiums actually operating in the image processing field?

[Answer] We are presently involved in talks in that regard with European firms in the private sector as well as the public sector. We have under study at this time the possibility of participating in a consortium with RCA.

[Question] Speaking of high technology, is Ciset interested in the SDI program?

[Answer] Certainly. But our interest also extends to the well-known European program EUREKA. Obviously, Ciset, being a services company, plays the role of last link in a long chain of industrial realizations; its entrance can come only after these systems, the product of advanced technologies, have begun their operational lives. We are therefore keenly interested in these high-technology programs such as the SDI, Eureka and the European orbital station Columbus. As we mentioned a few moments ago, for the Columbus program, we have already been awarded, on the basis of international bidding, an ESA contract calling for our participation in very specific areas, namely, space engineering and logistical activities.

This is an extremely interesting activity, Phase B1 of which has already been completed, and we are now entering Phase B2 of the Columbus program. In

addition to this activity, which we pursue in the ESA ambit, we are working together with Aeritalia on a space logistical service.

[Question] Before concluding our talk, would you explain to us what is meant by space logistics?

[Answer] It's very simple: One day, an orbital system will be operational in space, and someone will have to take care of keeping it "alive," so to speak.

[Question] Does this mean we will have a Ciset specialist astronaut?

[Answer] That's not to be excluded.

9399

CSO: 3698/90



## WEST EUROPE/AEROSPACE

### FRG FUNDING FOR HERMES, COLUMBUS, ARIANE 5

Duesseldorf VDI NACHRICHTEN in German 7 Nov 86 p 3

[Article by Wolfgang Engelhardt: "Hermes Is A First Step"]

[Excerpts] Bonn, 7 Nov--In a ministers' meeting in Bonn, the green light was given for the FRG to participate in the detailed study of the Hermes concept. It would cost Bonn about DM 30 million and would mean about a 30-percent share in the planning stage. However, the budget committee has blocked the funds for the time being. Minister for Research Riesenhuber is still expecting approval in November. This does not mean that final participation by Bonn in the development and construction of the small European space transporter is absolutely certain, but it would make it much more difficult to abandon the technologically ambitious project.

Minister of Finance Stoltenberg still entertains strong reservations about further expansion of the German space budget--the amount for Hermes is estimated to be at least DM 2 billion. The European minishuttle and German participation are being championed by the paper entitled Strategy Concept Space Travel 2000 from the Ministry for Research, which was available to the ministers' meeting as an aid in reaching a decision. It states: "European autonomy in manned missions will be necessary at the very latest when there is a commercial use for their fields of application. The United States could exploit its transportation monopoly for manned flights in a situation involving economic competition. Since the expectation of industrial use is foremost in the areas of materials research, process technology and life sciences under conditions of weightlessness, European independence is indispensable to an ability to compete. As a result, Europe must be in a position to operate manned stations in space on its own, at least on an occasional basis, and to ensure that the necessary transportation tasks are carried out."

Financing remains the principal problem with Hermes for the government of the FRG. Cost planning at the European Space Agency (ESA) estimates about DM 60 billion for the entire program until the year 2000. For German participation in the space station Columbus and the new Ariane 5 booster rocket with the HM 60 engine, DM 4.4 billion have to be found by 1995, that is now settled, the financial plans for it "are in place." For Hermes, Bonn would have to make another DM 2.2 billion available by the same time, that would be 30 percent of the total costs for the miniglider, with all the auxiliary systems and the

extensive ground installations. And, as experts stress, Bonn would have to assume one third of the costs in the case of Hermes in order to be able to lay claim to a substantial share of the technology.

With finances of this order of magnitude, the reserved attitude of Minister for Research Riesenhuber, who does not want to and who cannot finance Hermes just from his own budget, becomes understandable, because otherwise he would have to neglect other branches of research in an irresponsible fashion. So a basic decision is needed from Minister of Finance Stoltenberg and Chancellor Kohl about where the money is to be found for Hermes. The Strategy Concept Space Travel 2000 states: "Financial participation by Bonn of 30 percent is possible, if the medium-term financial planning is increased slightly and adjusted to the price increases in the ESA budget of 2 to 3 percent annually. Otherwise, a severe reduction in German participation in other space programs will be necessary."

The final decision concerning Hermes will not be made at the European level until mid 1987, but with the participation of the FRG in the definition phase an important step would have been taken towards the actual realization of this European program for manned space flight. The Challenger disaster in the United States, which for purely technical reasons makes European independence in manned space travel advisable, was a major contribution in this. There are also serious difficulties in the negotiations with NASA about European participation in the space station and its commercial use: the United States wants to have the entire Columbus project, the autonomous European module, subject to U.S. law. They are even going so far as to dictate the experiments planned for Columbus. ESA officials think it is possible that the talks will fail, resulting in a total reorientation of the European space program.

Following German concurrence with the definition phase for Hermes, the total concept, with the equipment, financing, organization and mission planning, would be studied by mid 1987. Then the ESA council of ministers could give its final consent for the start of construction, so that the first Hermes launch can be planned for 1995.

9581

CSO: 3698/118

## WEST EUROPE/AEROSPACE

### BRIEFS

NETHERLANDS ESA FUNDING--The Hague--The cabinet has decided to allocate more funding to the development of space travel. In 1985 the Netherlands Government spent 115 million guilders on aerospace, a sum which was to increase to 155 million guilders by 1990, according to the latest long-term estimate. This sum has now been increased to 187 million guilders. The increase is partly based on the additional funding to be provided by the EEC member states as agreed in Rome in January 1985. The European Space Agency (ESA) had asked and received more money for its long-term projects. The increased budget also allows the industrial base to expand, something which had already often been characterized as necessary. Thus far, only a small group of companies has been active in the space field. The increased funding should make this expansion possible. [Text] [Amsterdam COMPUTABLE in Dutch 19 Sep 86 p 17] 25023/12851

CSO: 3698/A008

## WEST EUROPE/BIOTECHNOLOGY

### BELGIAN ACHIEVEMENTS IN RECOMBINANT DNA TECHNOLOGY, GENETIC MANIPULATION

Zellik TECHNIVISIE in Dutch 17 Sep 86 pp 10-13

[Article by Eng Patrick Pype: "Toward an Industrial Revolution in Agriculture"]

[Excerpt] Recombinant DNA Technology

The use of recombinant DNA technology for the genetic manipulation of plants is a recent development. One of the major breakthroughs in the development of genetic manipulation of plants consists in using a natural vector system (*Agrobacterium*) to insert foreign DNA into a plant's genome. This technique dates from the 1980's. The laboratories of Prof Schell and Prof Van Montagu, in particular, did pioneering work in this field.

Since then plant biotechnology has gained momentum, and it was in that context that Plant Genetic Systems was established.

Barely 1 year after it was founded, Plant Genetic Systems was the first firm worldwide to succeed in genetically transforming tobacco (a model plant to be sure) by transferring a gene of a *Bacillus thuringiensis* bacterium, which codes for a protein with insecticide properties. In 1985, a mere 2 years after the foundation of the company, the gene was completely developed. Caterpillar larvae feeding on the plant's transformed parts die rapidly.

In 1986 official authorization has been granted to at least four companies (Plant Genetic Systems, Ciba-Geigy, Rohm & Haas, and Agrocetus) to conduct field tests with transformed plants.

Plant Genetic Systems can currently be considered a world leader in the field of genetic engineering, at least 1 to 2 years ahead of world-class firms such as Monsanto, Hoechst, Dupont, and ICI [Imperial Chemical Industries]....

This recent breakthrough in plant biotechnology has sparked a whole range of new application possibilities in agriculture which almost no one could have imagined a few years ago. The investment policies of the large

agrochemical firms, which believe that biotechnology will offer new opportunities to expand their existing production lines, are clear to see:

Ciba-Geigy is investing more than \$8 million, Shell Oil \$9 million, Dupont de Nemours \$65 million, BASF \$23 million, Hoechst \$50 million, and Monsanto is leading with \$250 million.

As a rule of thumb it can be said that up to 61 percent of investment is going to pharmaceutical applications, 23 percent to agricultural applications, and 16 percent to the remaining market segments (chemical engineering).

25012/9190

CSO: 3698/A015

## WEST EUROPE/BIOTECHNOLOGY

### EVOLUTION OF BRITISH, FRENCH BIOTECH POLICY

Paris EUROPEAN BIOTECHNOLOGY NEWSLETTER in English 3 Dec 86 p 7

[Special report: "Evolution of Policy Towards Biotechnology in Britain and France"]

[Text] Dr Margaret Sharp, of the Science Policy Research Unit at the University of Sussex, UK, has reviewed a decade of British and French biotechnology policy in a report to be published next year. EBN is privileged to be able to summarise her analysis. Dr Sharp has published several eminent reviews in the area of high technology policy.

A decade ago France was not able to support modern biotechnology. Institut Pasteur was the only center of excellence. Industry lacked the means to exploit developments, although state backed firms, Rhone-Poulenc and Roussel-Uclaf had invested in new technologies. In contrast, British scientists had by the mid 1970s established expertise in genetic manipulation, hybridoma technology and support areas, and British industry had experience in chemical process and biology.

In the USA biotechnology started in the late '70s. President Giscard d'Estaing impressed by Brazil's gasohol program sought advice on what France should do. Gros, Jacob and Royer wrote a report "Science de la Vie et Societe" in November '79 that preceded the UK's publication, The Spinks Report, produced in March '80. After Mrs Thatcher's UK election monetarism insisted, "if biotechnology is so profitable then industry will invest of its own accord." Despite the unhelpful climate three initiatives were implemented. Celltech, the SERC biotechnology directorate and the DTI biotechnology unit were founded.

In Chevenement's France, tomorrow's society would be a biosociety in which France would be the third biotech superpower after USA and Japan. Money was made available. The first Programme Mobilisateur [Incentive Program] was perhaps too ambitious, but it was positive! In the UK, the SERC and DTI were charged with building bridges but industry and government showed little interest. Academics suffering from financial restraint provided real effort and commitment to British biotechnology.

The French government provided enthusiasm and incentives, but CNRS and, in the beginning, INRA were stagnant. Few French scientists were skilled in the new technologies. State owned chemical and pharmaceutical industries proved willing to stimulate interest, but the agrofood area was less resolved.

The UK settled for limited but successful projects such as the university industry biotechnology clubs. The French effort at first lacked detailed planning, but its long term aims were clear. Detail was provided by the second Programme Mobilisateur, but despite the efforts of Professor D. Thomas, French academics and industry were initially reluctant to work together.

Biotechnology companies were funded by Venture Capital in Socialist France and Conservative Britain. In the UK established industry played a big role in funding early developments, whereas in France the government played a strong supportive role.

It is too early to assess the relative chances of success of the two national programs, but given the poor status of the French biotechnology infrastructure 10 years ago, the laurels must go to France. The UK's policy by default, cuts funds to research areas as soon as they become commercially interesting.

Contact: Dr Margaret Sharp, Science Policy Research Unit, The University of Sussex, Brighton BN1 9RF. Tel: 44-273-686758

CSO: 3698/A078-E

## WEST EUROPE/COMPUTERS

### EC'S JOINT RESEARCH CENTER DEVELOPS FIBER OPTICS LAN

Milan TRASMISSIONE DATI E TELECOMUNICAZIONI in Italian No 19, Oct 86 pp 54-57

[Article by M. Malcangi under the "Systems and Networks" rubric: "Dual Network;" first paragraph is TRASMISSIONE DATI introduction]

[Excerpts] The Joint Research Center (JRC) of the European Community Commission recently presented in Varese the results of the most recent research in the field of computer networks.

The subject under discussion is a network based on fiber optics technology which is designed to connect computers with different capacities and characteristics.

The network produced at the JRC headquarters in Ispra has been designed to meet industrial and telecommunications standards.

A major element of originality in the Dual Network lies in its capacity to duplicate, on the basis of a scale field, the functions offered on an extremely vast scale by the public packet-switched network based on the standard CCITT X.25. This allows the Dual Network to operate within an organization as an extension of the public network and consequently of its services, while at the same time providing a standard interface reference for interconnected computers.

The heavy data traffic is processed by a wide spectrum of communication interfaces, and in particular by the "Ethernet" interface, offered in an original mode by Digital, Intel and Xerox and currently adopted as an international standard.

These interfaces resolve short distance communication problems well. The Dual Network in reality provides equivalent services even over long distances for a wide variety of connections.

From an architectural point of view, the system of fiber optic nodes and connections of the Dual Network produces in practice an independent computer system. This represents a new element in the field of local



networks, inasmuch as a part of the intelligence in this type of network is normally assumed to be inside the computer hooked into the network.

The requirement for the network to perform a more dependent [as published] and intelligent role is justified by the existence of the increasingly greater flexibility and heterogeneity which characterize the new services.

From this perspective, the Dual Network represents an important effort in the direction of greater flexibility and heterogeneity in turning computers into inter-operative machines.

Numerous computer firms have been invited to connect their most recent systems in order to demonstrate the potential of the Dual Network.

The test trials have involved not only the technology of the networks, but also the functionality of advanced applications such as access to remote processing services, office automation, text communication systems, graphics, images, and brief memorized spoken messages, computer aided design, and image processing systems.

Probably the most innovative characteristic of the Dual Network is its ability to handle interconnections between computers in "broadcast" type modes. This is a service of the radio or television type produced with packet technology, to which error control and speed control in data exchange between the transmitter and receiver have been added.

Here we are dealing with very important, if not absolutely essential, functions in order to achieve complete success in communications between computers.

The fact that error free information is furnished to the computers may be considered a high level of service. The Dual Network performs this by temporarily holding the data to be transmitted in its own memory, and then sends them, free of error, to the computer.

With regard to controlling the speed of data transmission, it is important inasmuch as it allows the data to reach the system at an acceptable speed. This mechanism is in practice the application in the broadcast context of a mechanism which already exists in the X.25 context for point-to-point connections.

Considering that computers require a finite time for processing of portions of data (characters, lines, blocks, etc.) and that normally the computer is involved in numerous activities which evolve in parallel, a certain elasticity is required from the network to allow

the person producing the data and the person processing them to function properly.

The solution proposed by the Dual Network is analogous to that used by radio and television in providing their services with the addition of accuracy in the data flow. It is anticipated, in view of the rapid reduction in production costs of processors, that there will certainly be a transition from distributed computer technology (geared toward the use of common databases) to parallel computer technology in which the independence of the computing unit will contribute to the common solution of problems.

In a similar setting, possible examples could be interaction among expert systems and other artificial intelligence systems with cooperating data and base systems; coordination of powerful computing systems, each one specialized in the solution of particular problems or aspects of a particular problem; or even a workstation participating in a conference between computers.

It seems evident that future parallel processing architectures will favor the development of programming languages oriented largely toward the description of the rules of the game rather than toward the details of computing. In practice, in the future, computing will be viewed as cooperation between processors, all involved in working on a common theme, each operating, however, not in a programmed manner, but rather on the basis of its "logic" and its "knowledge."

Such a prospect indicates a high [degree of] freedom in the modalities of communication in a broadcast context.

The communication services and the synchronization mechanism proposed by the Dual Network certainly represent an ideal solution for these needs.

The Dual Network, based on a ring and double-node fiber optic support, is a local network of the general purpose type, particularly geared toward the typical requirements of a campus-type organization.

The network is able to cover long distances thanks to its ring configuration with active nodes.

Its only restriction is the distance between nodes. This must not be greater than a kilometer and in any case it depends on the quality of the fibers.

The complete interconnectivity between nodes ensures the highest

communication capacity, while at the same time offering savings in wiring costs.

The properties typical of fiber optics also confer a high degree of invulnerability.

Its 40 MByt/second of throughput allows a great amount of data to be transmitted simultaneously between the nodes, while at the same time preserving in its entirety the network's performance.

The token ring type method of access implies a minimum of overloading due to the protocol, guaranteed access time, and good adaptability even in the worst [data] traffic conditions.

Reliability has been taken into account by producing a monitoring scheme distributed over the entire ring with automatic reset of the network based on watchdog and bypass systems within the nodes.

Particular emphasis has been placed on broadcast and on synchronization services by introducing into the lowest level protocols some special primitives which make the development of high level services for broadcast and guided distributed environments particularly simple and efficient.

The nodes adopt the X.25 interface and the Ethernet for the connection of the equipment so that dialogue with the most heterogeneous computer context is possible.

The Dual Network is a network of the backbone type, for example, the nodes interface with the systems capable of producing the first interface level toward the data: mainframe, large workstations, terminals or line concentrators, etc. The final interface level of the system, like that of word processors, telexes, personal computers, cannot come into direct connection with the Dual Network node. These can be connected to the Dual Network (and thus among themselves) by X.25 concentrators. The host computers are connected to the LAN by two types of interface:

--X.25 for point-to-point connections via gateway;

--Ethernet for multi-point connections among several bus with a transparent modality.

[Box Insert p 57]

### Technical Characteristics of the Dual Network

- Local area network: token ring (contiguous frames)
- Medium: fiber optics (multi-mode 100-140 um)
- Transmission speed: 40 MByt/second (benchmarked 50 MByt/second)

- Maximum distance between stations: 1.5 km.
- Maximum number of stations: 256
- Node by-pass: electrical (optical optional)
- Addressing: 16,000 different addressing trajectories
- Packet size: 4 kbyte (with CCITT CRC-16 sumcheck)

### Functional Characters

- Internal capacity: point to point service, broadcast, and synchronization services
- External interfaces: X.25/3 (up to 8 lines/node); Ethernet (up to 4 lines/node)
- Operative process: connection manager--packet-radio manager--mesh manager--network supervisor
- Gateways: X.75 gateway manager--Ethernet gateway manager
- Downloading: bootstrap [as published] via EPROM--high level software download--from network controller (40 second)

### Hardware

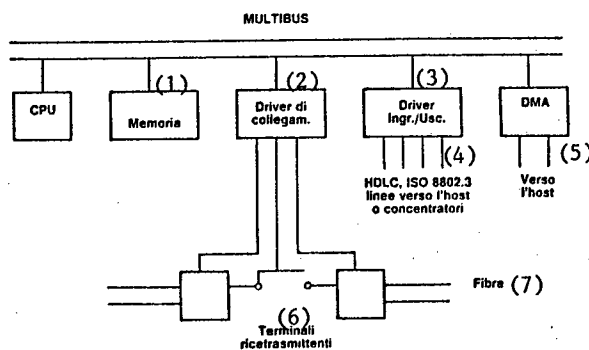
- EUROCARD--format cards, multibus architecture
- TTL and ECL technology for the link driver
- INTEL 8086 main processor which can be used with INTEL and MOTOROLA processors
- Plessey transceiver, Manchester biphas encoding LANLINK 50 (from 20 to 50 MByte)
- HDLc coupler TITN board TN 8640 capable of giving 1 x 48 kbyte/second and 1 x 9.6 kbyte
- Ethernet coupler INTEL ISBC 18651--standard plug-in connector--alternative without transceiver, supported without protection
- X.25 connections--RS232 standard with V.24 connector--RS422 optional with V.11 connector
- Link driver performance: 800 packets/second
- Node throughput (with Intel 8086 processor) 200 packets/second
- Buffer memory--128 k coupler--512 k node work area--16 k link driver

in transmission--32 k link driver in reception  
 --Redundant code for critical fields of the packet

#### Software

--Written in C language  
 --X.25 produced according to the CCITT 1984 specifics; DCE and DTE interface  
 --Point to point connection  
 --Packet radio multicast  
 --Packet mesh multicast service

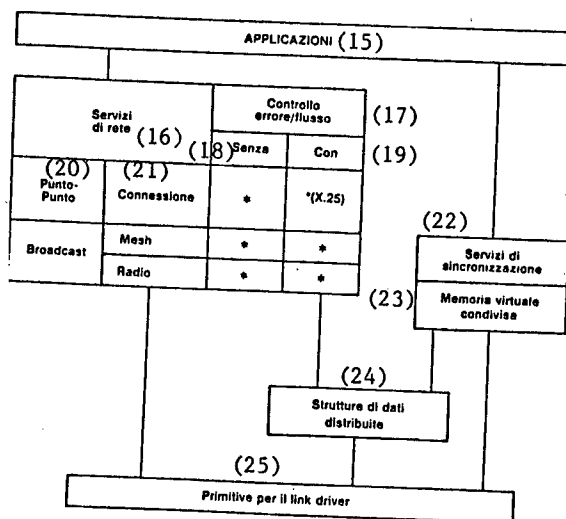
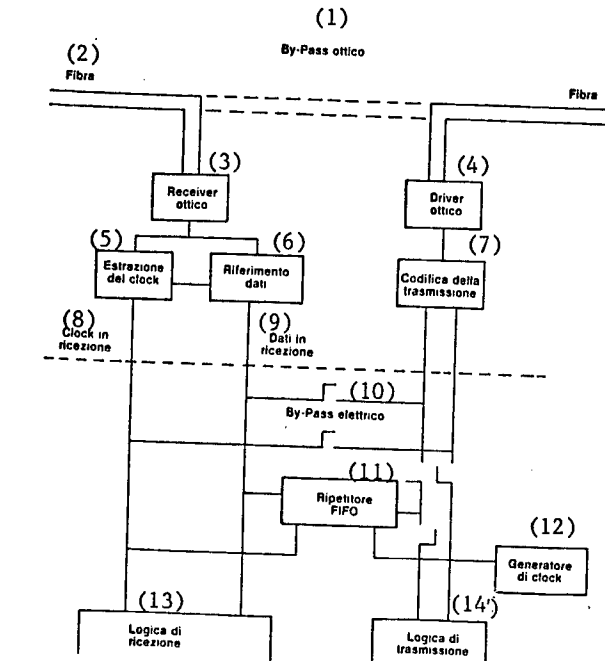
Figure 1. Dual Node



#### Key:

1. Memory
2. Link driver
3. Input/output driver
4. Lines towards host or concentrators
5. Towards host
6. Transceiver terminals
7. Fiber

Figure 2. Dual Link Level



Key:

1. Optical by-pass
2. Fiber
3. Optical receiver
4. Optical driver
5. Clock extraction
6. Data reference
7. Transmission coding
8. Clock in reception
9. Data in reception
10. Electrical by-pass
11. FIFO repetitor
12. Clock generator
13. Reception logic
14. Transmission logic
15. Applications
16. Network services
17. Error/Flow control
18. Without
19. With
20. Point-to-point
21. Connection
22. Synchronization services
23. Shared virtual memory
24. Distributed data structures
25. Primitives for link driver

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CSO: 3698/M060

## WEST EUROPE/COMPUTERS

### SPAG VALIDATION CENTER FOR OSI STANDARDS

Amsterdam COMPUTABLE in Dutch 3 Oct 86 p 3

[Text] Brussels--Eight members of the standards Promotion and Application Group (SPAG, a European cooperative structure that aims at promoting data processing standards) have established a company to develop validation tests for (communication) products based on the Open System Interconnection (OSI). In addition, the joint enterprise will also support both users and suppliers in conducting these tests.

SPAG Services SA (the company's current name) will have its seat in Brussels and is a joint initiative of Bull, ICL [International Computers Limited], Nixdorf, Olivetti, Philips, Siemens, STET [Turin Telephone Company], and Thomson. The company will be headed by Siemens' Herbert Donner.

The provisional budget amounts to 2.4 million ECU's [European Currency Units] (5 million guildens). The participating companies are expected to provide the new company with an initial staff of 15 people, increasing to 30-40 man-years of labor per annum.

The SPAG group itself was founded in March 1983 to submit proposals for the implementation of the OSI model on the basis of existing standards. The participating suppliers (12 European manufacturers) have committed themselves to use these standards in their own products.

Over the past 2 years the group's main activity has consisted in compiling a "Guide to the Use of Standards" (GUS). This publication has been offered to CEN/CENELEC [European Standards Committee/European Electrotechnical Standards Coordination Committee] and CEPT [European Postal and Telecommunications Conference] as the basis for their standardization efforts. It will also be used by the 12 SPAG members and a number of American suppliers for developing communication products. By now, well over 2,000 of these guides have been sold.

With GUS being their proposal for the further implementation of the OSI model, some members of the SPAG group have shifted their attention to developing and offering support tools enabling users and manufacturers to test the proper application and implementation of OSI standards. In



the near future it is hoped to cooperate in this area with users and European PTT's [Post, Telegraph, and Telephone].

The validation center's activities focus on these parts of the OSI model that are the subject of SPAG proposals, but for which there are as yet no European standards. The SPAG members consider it very important that validation facilities be available for these not yet (fully) standardized layers of the OSI model, thus enabling products to be developed on the basis of these proposals.

#### Stages

For those layers that have been standardized, the European Community has already set up a project for the development of validation facilities.

A number of laboratories, including KEMA [Electrotechnical Equipment Testing] in Arnhem, take part in this project.

A second role for SPAG Services SA consists in facilitating, i.e., making available the technical specifications needed for systems from different manufacturers to communicate with each other. In this respect the company targets the user, the developer, as well as the systems integrator.

The various facilities will become available in stages. The first facility, available in December, will be an information service. The first testing facilities--for message handling and file transfer and management systems--are expected to be operational between December 1986 and mid-1987.

Subsequently, other facilities will become available, such as a "reference implementation" (first quarter of 1987), a standard access method for networks consisting of systems from different manufacturers (second quarter of 1987), an arbitration service (second half of 1987), and a support facility for the development and validation of new products, which is to be completed by the first half of 1988.

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## WEST EUROPE/COMPUTERS

### STATUS OF NETHERLANDS DATA PROCESSING PROJECT

#### Distribution of Funds

Amsterdam COMPUTABLE in Dutch 19 Sep 86 p 3

[Excerpt] Every part of the Data Processing Stimulation Plan (INSP) is making good progress. "In spite of the relatively limited means, the targets are clearly coming closer." So states the introduction to the INSP status report, which was released at the same time as the science and education budget. For the 1986-1989 period, 980 million guilders are still available. By 1986, 696 million guilders had been spent. The funding currently available will go to education (268.5 million), research (220.3 million), the market (355 million), government applications (129.1 million), and general information (7 million).

#### Project Results

Amsterdam COMPUTERWORLD in Dutch 16 Sep 86 p 2

[Text] The Hague--Good progress is being made in all areas of the Data Processing Stimulation Plan (INSP). The targeted results are clearly coming nearer, despite the relatively modest resources. This statement is from the second INSP status report, submitted to the Second Chamber by the Cabinet together with the budget.

The INSP is now at the halfway point and, according to the second report, insights have deepened and important new plans have taken shape, thanks especially to increasing collaboration with industry. Among other projects, the Cabinet points to the SURF [Cooperation of University Computer Facilities] plan, the HBO [Advanced Vocational Training] plan, and the NIVO project (more computers in secondary schools).

These developments have led to adjustments and shifts in the INSP's Ministry of Economic Affairs section. More funds have been earmarked for education and research. An annual 30 million guilders will be allocated to innovative public sector applications, and information needs have also received additional funding.

Funding of INSP's market sector segment has been increased to stimulate information technology applications. The Ministry of Science and Education has also released more funding for INSP through internal budget shifts.

The Ministries of Economic Affairs, Education, and Agriculture have contributed a total of 676 million guilders in funding to INSP's initial 2 year (1984-1985) plan. Nearly 1 billion guilders has been scheduled for the 1986-1988 period.

## WEST EUROPE/METALLURGICAL INDUSTRIES

### ADVANCED POWDER STEEL PLANT IN ITALY

Milan AUTOMAZIONE E STRUMENTAZIONE in Italian Jan 86 p 86

[Text] The Metallurgical Experimental Center plans to install a plant at Aosta, in cooperation with Deltasider, for the production of high-quality powdered steel, by atomization with inert gas in a vertical chamber.

The plant will be provided by the Metallurgical Division of Asea and will also incorporate an Osprey Metals Ltd atomizing nozzle to enable future production of preforms and billets, using rapid solidification processes.

To successfully control the temperature of the bath and the downflow of the steel during atomization, use will be made of an Asea ladle of revolutionary design, called Calidus.

This ladle differs from conventional ones in that its shell is made of a composite material with ceramic matrix, reinforced with special fibers, permitting the passage of magnetic fields.

It will thus be possible in the Calidus ladle to both adjust and maintain the temperature of the metal it contains.

The ability to heat, degas in a vacuum, process in a controlled atmosphere, and accurately adjust the jet of steel during the pouring, make it possible to use the ladle for all operations typical of ladle metallurgy.

The above described plant brings together the most advanced Asea know-how for the production of powdered steel, and will enable Deltasider to enter the market for powdered-metal products for particularly demanding applications, in a very short time and at maximum levels.

Asea SpA; Via G. Fara, 39; 20124 Milano.

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CSO: 3698/90

## WEST EUROPE/MICROELECTRONICS

### MILAN'S MICROELECTRONICS FAIR REVIEWED

Milan AUTOMAZIONE E STRUMENTAZIONE in Italian May 86 pp 107-116

[Article by Lucio Biancoli, editorial staff: "BIAS Microelettronica '86 - 20th Exposition - Milan, 18-22 May 1986 - Final Report"]

[Text] The 20th BIAS Microelettronica Exposition, an international-class fair and symposium, held in the Fiera di Milano section of the city, 18-22 May of this year, was a complete success.

Strictly speaking, the BIAS Microelettronica Exposition, which is organized by the EIOM [Italian Trade Fair Organizing Board], is a spinoff of the BIAS expositions, which are devoted to automation and instrumentation as a whole, and was created in order to differentiate from these applicative sectors the industrial and commercial activities centering on the specific fields of components design and manufacture, production and automated-testing systems, laboratory instrumentation, and microcomputers and peripheral equipment.

The acronym BIAS, which at one time stood for "Automation and Instrumentation Biennial," has therefore taken on a new physiognomy: It is, in fact, no longer a biennial exposition, but rather two expositions, each very different from the other, although some slight marginal crossovers do exist: The BIAS exposition, which takes place approximately every 18 months (depending on availability of the necessary premises from the Milan Trade Fair Board), and the BIAS Microelettronica exposition, which alternates with the first, again by approximately 18 months. In other words, one of the two expositions is held approximately every year and a half, on a rotating basis with the similar Dusseldorf Interkama and Paris Mesucora expositions, and occupying a place alongside them on the European agenda. Thus, as we have had several occasions to mention, appointments with exhibitors and visitors are made through the CEMA [European Committee for Automation Expositions], based on a detailed program for the development of industrial and commercial relations among the major industrialized countries.

The traditional success that characterizes these shows was confirmed once again at Exposition '86, in the form of a larger area devoted to exhibits, a larger number of exhibitors and visitors, and the quantity--in addition to the originality--of the innovations exhibited.

Interest in the Fair's various expositions centers essentially on the opportunities they offer for producers and sellers to enter into direct contact with interested persons, and to exhibit the results of their efforts and initiatives. Seen from the other side, they also provide visitors--consisting predominantly of experts in search of technical and economic solutions--with opportunities for quickly and efficiently running market surveys, aided by an easily consulted bilingual catalog and the numerous reports on the exhibits, appearing before, during and after, in the magazine AUTOMAZIONE E STRUMENTAZIONE, the BIAS's official organ, published by the same organization that oversees the Fair itself.

#### Some Interesting Facts

Before presenting the statistical data relating to exhibitors and visitors, which we shall discuss further on under appropriate headings in this final report, we think some of the features that, as has been the case with each successive Exposition, rendered this event even more functional and leisurely, are worthy of note.

For this Exposition, the layout of the pavilions made it possible to provide two entrances: the Porta Domodossola entrance and the Porta Carlo Magno entrance.

A large parking lot was provided for the exhibitors' cars, some 800 meters from the Porta Carlo Magno entrance; a continuous shuttle service provided bus transportation, entirely free of charge, between the Exposition's two entrances and the parking lot, and between the entrances and the nearest Metropolitana stop. Inside the Fair grounds, a computerized service, geared to a local network, provided anyone with immediate information as to the location of any stand, in any pavilion; the available services; the meetings being held in conjunction with the Exposition (conventions, press conferences, round tables, workshops); etc.

#### Significance of the Exposition

The innovations were many, but those seemingly destined to affect developmental plans for the medium-to-long term--for better or for worse--were but a few. Undoubtedly one of the most interesting had to do with the definition of new, more complex and faster architectures for powerful and sophisticated microprocessors. The products characterizing contemporary microelectronics are not solely related to the development of new microprocessors. The so-called "semicustom" circuits are having a considerable impact on the market: These devices, in their virgin state, contain an array of basic functions which the user activates and interconnects in the manner best suited to the implementation of a specific application. Among other things, the philosophy of the semicustom circuit is compelling a reexamination and redefinition of the integrated-circuit producer's role and that of his client.

Among the innovative products, it is also worth citing the wide range of digital electronic devices for the real-time, high-speed analysis of analog signals, integrated for the analysis of voice and imaging, programmable by the user, and frequently taking the form of fast supermicroprocessors (as in the case of the gamut of components exhibited by Texas Instruments).

The list of new products could, and should continue, including surface-mounting techniques, equipment for automated testing, and for the unmanned factory, CAD, etc.--a practically endless number of processes and techniques that, today, are fueling the advance of electronics towards the achieving of ever new and fascinating objectives. Research in the field of microelectronics pursues a thousand rivulets which often intersect with one another. Miniscule devices and extremely complex hookups frequently have common roots from the standpoint of the technology from which they were developed.

It is obviously not possible--for the purpose of understanding the level that has been attained--to compile a complete list of everything that has been done. However, one need only view some of the milestones achieved, or dwell on some of the projects currently under way or on certain trends that have emerged, to visualize the avenues that are open to exploitation.

And it is this very abundance of technological innovations that has accounted for the undisputed success of this Exposition, to the point where most of the exhibitors have already confirmed their intent to participate in the next Exposition.

#### Inauguration

The Exposition was billed well in advance of its opening, through an intensive publicity campaign by way of the press, both daily and trade, with a steady flow of press releases; through direct and indirect contacts with any and all potentially interested persons and organizations; and through contacts with embassies, consulates, trade missions, etc.

At a press conference held in Milan just a few days before the opening, Professor G. Degli Antoni of the Faculty of Cybernetics in Milan and Engineer P. Pistorio of the Agrate-based SGS both emphasized the importance, from their authoritative viewpoints, of what has been accomplished and of what is about to be accomplished in the realm of microelectronics, stressing in particular the directions in which it is advantageous to channel productive efforts and investments in research and development programs and to seek fields lending themselves to the exploitation of modern technologies.

The inauguration of the Exposition came to a close with some noteworthy comments by Senator Salverino De Vito (Minister for Southern Italy), which we deem it of interest to dwell on here.

In his remarks, the minister set forth the need for a forward leap in the quality of state-funded projects for Southern Italy, a leap that can come about only through a drawing up of strategic lines of action from which concrete projects can be derived that will improve the South's employment situation, and through a pursuit of policies providing the necessary opportunities for firms to develop products and services with a potential for becoming competitive on an international level.

Through state-funded organic programs, which are being developed with due regard for land-use as well, and with a view to attracting investments in the southern part of the country, Southern Italy will become more and more a producer and not solely a consumer of goods and services.

In particular, Minister De Vito pointed out that "Our analysis has not overlooked the influential part the strategic sectors of the electronics industry are playing in the productive system's ongoing morphological and physiological change. We have analyzed the effects, in our country as well, of the penetration of microelectronics technologies into the productive, administrative and organizational processes of our economic activities, and have recognized the intersectorial nature of these innovations which, it is clear from current consolidated trends, point towards a radical change in the two vital organs of our productive system: The factory and the office. We therefore see increasingly asserted the organic intertie between the production industry and the services industry; and this has steered us towards a policy of stimulating the strategic factors of growth."

This is the direction, Minister De Vito pointed out, being given to new supplementary funding for Southern Italy, which "we intend to characterize as a stimulant to the integrating of research with the production effort, by offering opportunities and potential advantages to our industries and our national research organizations for expanding their network of research institutions and laboratories; by supporting the implementing of cooperative research projects in the form of joint ventures, consortiums and consortial firms, and international cooperative and exchange programs in the scientific and technical field; and by offering opportunities for Southern Italy's universities to share in the processes of modernization of our national economy."

Promotion of First 'Committee for Development of the Microelectronics Culture' by BIAS-Microelettronica

Through the promotional effort of the BIAS Press Office, the 20th BIAS-Microelettronica Exposition saw the creation of the first "Committee for the Development of the Microelectronics Culture" in Italy. The new committee, which will operate in conjunction with the already-functioning Organizing, Promotional, and Scientific Committees, seeks on the one hand to represent a meeting point for reporters and qualified experts, each with mature experience in different fields (social, economic, financial, scientific, and technological); and on the other hand to uncover new insights into the multiple aspects that characterize the microelectronics industry.

During its initial months of activity, the Committee will produce a number of informative documents, each of which will develop a specific topic applicable to the areas of interest of each of its members, and which will then be distributed to all the news media.

During the proceedings of the BIAS-Microelettronica Exposition, other initiatives were undertaken to publicize this Committee's activities.

For next year, an expanded program is under study, which is to be submitted for approval by the president of the EIOM, the Board responsible for organizing the BIAS expositions.

#### The More Important Statistics

As promised above, we report now the more important statistical data that characterized the 20th Exposition.

#### Statistics Regarding Exhibitors and Product Sectors

The 20th BIAS, Exposition '86, an International Fair and Symposium on Automation and Instrumentation, dedicated to Microelectronics, exhibited a complete panorama of products and technologies, with exhibitors from all over the world.

The following statistics are relevant:

Exhibit area: 32,600 m<sup>2</sup>;

Exhibiting countries: 24;

Total number of exhibitors: 1,475, as follows, by countries of origin, respective numbers, and percentages of total (in parentheses): Italy 518 (35.1 percent); United States 304 (20.6 percent); Germany 186 (13.3 percent); England 134 (9.1 percent); Japan 86 (5.8 percent); Switzerland 73 (4.9 percent); France 71 (4.8 percent); Taiwan 21 (1.4 percent); Belgium 13 (0.9 percent); Korea 12 (0.8 percent); Holland 8 (0.5 percent); Sweden 7 (0.5 percent); Austria, Denmark and Spain 6 (0.4 percent); Israel and Ireland 5 (0.3 percent); Canada and Finland 4 (0.3 percent); India 2; Australia, Hong Kong, Norway and Singapore 1.

An analysis of exhibitors in terms of the categories of products exhibited yields the percentage distribution shown in Table 1.

However, the data represented in Table 1 are subject to some interpretation: Actually, only the exhibitor's principal sector of activity was taken into account, although some exhibitors operate simultaneously in more than one sector (for example, measuring instruments and components).

The number of exhibitors operating in more than one product sector came to 8.1 percent of the total.



Table 1

Percentages of Exhibitors According to Principal Product Sector

<u>Sector</u>	<u>Percent of Exhibitors</u>
Electronic Components	41.5
Automated Testing and Production Systems <sup>(1)</sup>	12
Measurement Instrumentation <sup>(2)</sup>	10.4
Microcomputers and OEM Peripherals	3.6
Telecommunications Systems	1.2
Educational Equipment and Facilities	0.8

(1) For the electronics and electrotechnical industries.

(2) For laboratories and applied scientific research in the electronics sector.

In addition, also to be considered is the presence of exhibitors operating in unclassified activities; these represented 22.4 percent of the total number of exhibitors.

Noteworthy, as regards exhibitors, was the presence of numerous Italian firms, particularly in the area of production of printed circuits, where--once again--traditional Italian mechanical engineering know-how combines well with the capability for devising highly sophisticated electronic control designs.

#### Visitor Statistics: Sectors of Interest and Predominant Activities

Over 74,500 qualified visitors filled the five pavilions of exhibits (2, 3, 7/1, 7/2, 7/3) of the Fiera di Milano throughout the five days of the Exposition.

Also noteworthy was the number of foreign visitors (4,800 from all over the world), when one considers that Italy, in microelectronics, is essentially a major consumer of sophisticated instrumentation and components. On the other hand, in addition to these latter products, almost exclusively imports, there was at the BIAS Exposition this year a remarkably large offering of electronic products for the electronics market (from power supplies, to functional cards for microprocessor-based systems, to equipment for automated testing and for the production of printed circuits, the latter being a sector in which Italy enjoys a good reputation at international levels as well).

But what is the profile of the BIAS Exposition's visitors? What companies do they represent? To which of the numerous product sectors is the Italian electronics industry--meaning that industry made up of large-sized and, above all, small- and medium-sized firms which design and produce equipment for the most diverse markets (from audiovisual products, to systems for the control of productive processes, to sophisticated military equipment)--addressing its efforts?

The BIAS Research Office has analyzed a sampling of the visitors, and has come up with some interesting findings which we have summarized in Table 2. Some of the findings warrant comment: First of all, as to the qualifications of the visitors, 23.1 percent of the visitors were from high management levels, and 22.5 percent from design departments. This numerical balance indicates that the interest being shown in microelectronics is not solely technical, but is also rooted in the strategic choices a firm must make with regard to allocating its investments in machinery and technologies.

Like the other countries in the technological vanguard, Italy, too, tries to keep its production-systems and design know-how updated. In this regard, the percentages of technically qualified visitors from the production sector and the research and development sector--17.5 percent and 15.2 percent, respectively--follow closely behind the percentages for the first two sectors.

Table 2

## Statistical Data Pertaining to Visitors

Item	Percent	Item	Percent
Function Within the Firm:		Sectors of Activity of Firms Re-presented by Visitors:	
Management	23.1%	Industrial electronics	34.7%
Design	22.5%	Data processing	14.3%
Production	17.5%	Automation	13.7%
Research and development	15.2%	Telecommunications	12.5%
Marketing	9.9%	Engineering	6.6%
Maintenance	8.0%	Aeronautics/Space	4.7%
Quality Control	4.8%	Military electronics	4.4%
Consultant	4.3%	Radio/TV	4.2%
Other	7.9%	Automobile	4.0%
Product Sectors of Interest:		Medical electronics	3.9%
Electronic components	51.6%	Electrical appliances	3.4%
Computers and peripherals	34.8%	Mensuration	2.5%
Laboratory instrumentation	32.8 %	Hi-fi electro-acoustics	2.3%
Production and automated-testing instrumentation	28.9%	Nuclear electronics	1.0%
Telecommunications/Telematics	18.8%	Other	5.9%
Other	2.8%		

Note: Percentage sums exceed 100, since visitors indicated more than one specified category each.

As for the areas of interest, most of the visitors divided their attention among several sectors, headed, of course, by electronic components. Notably in second place were computers and peripherals for industrial use, indicating a growing interest in electronics applications on the part of firms active in the assembly of functional subsystems for the fabrication of equipment dedicated to a specific purpose.

First place among the sectors of activity of the firms that visited BIAS Microelettronica was occupied by industrial electronics with 34.7 percent, followed by data processing with 14.3 percent, automation with 13.7 percent, and telecommunications with 12.5 percent. The first of these figures confirms the presence in Italy of a large number of firms engaged in design and production activities, whose electronic products end up being integrated with equipment of various kinds designed for use throughout the manufacturing industry, and contribute to the "updating" of sectors considered mature or in which technical upgrading is vital to remaining competitive at a national and the international level.

On the other hand, the significant percentages of interest in the other sectors mentioned above show that firms operating in the data processing, automation and telecommunications fields are much more numerous than is generally thought, and that--probably--they would be of transnational class if they operated in a socioeconomic and financial context that is in closer alignment with the more industrialized countries.

The visitors to BIAS '86-Microelectronics pertained to all facets of our national productive fabric: They ranged from the self-employed professional, through a representation of all those small- and medium-sized firms that comprise the real productive fabric of the Italian reality, to the multinational firms. The common denominator of the visitors, consisting as they did, for the most part, of production heads and technical personnel employed in research and development (although there was no shortage of procurement-department personnel), was the high level of professional training.

The interest shown by these persons stemmed from the opportunity being provided them to view at a single glance, so to speak, all the most advanced technologies being applied to the design and engineering of components, instrumentation, and equipment for production and in-process gauging and testing. In many cases, BIAS also represents the only opportunity to view and evaluate products that are being exhibited while still in their preview stage and which will actually be available on the market only some months later, thus enabling timely budgeting of investments and updating of the productive activities that will be concerned with the new product.

Most of the firms represented by the visitors of BIAS '86-Microelettronica pertain to the industrial area and operate in the electromechanical, industrial automation, electromedical equipment, process-control, telecommunications and telephony sectors. Research institutes, universities and high

schools comprised a smaller percentage. For the first time, there was a notable presence of visitors interested in the area of CAD/CAM/CAE and from firms specializing in the performing of specific functions for third parties (for example, the stacking of cards, automated testing of components, quality control, etc).

This latter aspect is an important indication of the change that is taking place in our country's productive sector. Many small- to medium-sized firms are realizing that it is impossible to maintain their competitiveness without making sizable investments in machinery for the manipulation and assembly of modern electronics components and for the testing of cards. Such investments, however, are, generally speaking, beyond their reach, and this situation is producing a new category of operators--a kind of industrial tertiary, which furnishes these services to various firms.

In the opinion of several exhibitors who were interviewed, the visitors' level of qualified participation was highly gratifying.

The exhibitors were able to make many contacts with new firms very interested in their production. The products of major interest included: Surface-mounted components, microprocessors and related support chips, semicustom and special-purpose components, and, in the instrumentation sector, equipment for the measurement and control of electromagnetic emissions. In the automated-testing systems sector, the demand was found to be greatest for the low-cost systems, because even the small-sized firms have realized that it is a necessary investment for ensuring a better-quality product and maintaining market competitiveness.

As regards the market, the outlook is for a good recovery, with the majority of the exhibitors concurring in the view that the contacts made will generate sales in the short-to-medium term. Thus, 1986 should end up as a year of rebound for all sectors of microelectronics, confirming the findings of the BIAS Research Service's survey made before the opening of the Exposition. With unemployment currently rising to ever higher levels in all areas of endeavor, the microelectronics sector is deviating sharply from this trend and holds promising job prospects.

One of the major concerns among the operators in the sector is the need for personnel specialized in technical and commercial, marketing and customer assistance activities. A very precise and knowledgeable demand is being left unmet by a somewhat scarce offering in terms of quantity and professional qualifications.

In this regard, and in view of the sizable participation by students who visited the BIAS Exposition under the guidance of their professors, it is to be hoped that the educational institutions will soon be able to update their structures, thus enabling students to acquire knowledge that will qualify them immediately to carry out the tasks assigned to them by the firms that employ them.

As a matter of fact, the major problem encountered by those holding degrees and diplomas, who each year knock on the doors of the labor market, is the lack of a sufficient amount of experience in one sector, although once in possession of a fairly good job resume, the doors that open are many indeed.

#### BIAS '86-Microelettronica Survey of Electronics Markets

In connection with the 20th Exposition, the BIAS-Microelettronica Research Service initiated and conducted a survey among a significant and representative sampling of firms operating in the electronics components, automated-testing systems, laboratory instrumentation systems, and automated printed-circuit production equipment sectors.

The survey is subdivided under four headings (components design and manufacture, automated-testing systems, laboratory instrumentation, and automated production systems).

The complete version of the results of this survey is being published in the magazine AUTOMAZIONE E STRUMENTAZIONE; in fact, the first part appeared in the March 1986 issue; the second in the May 1986 issue; and the third and fourth will be published in the June and July-August issues, respectively.

In the interest of thoroughness in reporting, we include here a brief summary, pointing out, however, that the complete text is also being made available as an attachment to the abstract of the present final report on the success of the Exposition.

The purpose was to determine market and price trends following the end of a troubled year, as was 1985, with sights set on a year that has begun more auspiciously, and also to uncover the principal events of a technological nature capable of influencing or producing significant changes in commercial policies.

The survey, polarized toward the Italian reality, was integrated with data and findings from studies conducted by international firms specializing in market research.

The results obtained were summarized in the form of four documents, each devoted to one of the sectors of activity brought, in this way, under the BIAS-Microelettronica Research Service's "microscope."

There was no lack of surprises. The Italian market outperformed not only the American business market in 1985, a well-known fact, but also many European markets.

Growth occurred despite the rise of the dollar (most of our imported products come from the U. S. dollar exchange area) and, what is even more significant, without entailing detriment to 1986, which looms as a year of consolidation

is even more significant, without entailing detriment to 1986, which looms as a year of consolidation of the positive trends that are already under way, and of improvement of those that have tended to lose momentum in the recent past.

--In the components sector, this year's sales are expected to top 2,000 billion lire, more than half of which will be based on semiconductors, for an increase of 13 percent over 1985. As for prices, following their steep rise in 1984 and precipitous fall in 1985, a gradual return to stability is foreseen.

Thus, the outlook is one of a realignment between the cost of the product and its sale price on the market, a realignment that is already discernible for the products that have taken most of the stress of the past 2 years.

The survey has disclosed the likelihood of an average price rise of 5 to 10 percent in 1986 for all products, and a greater increase likely for memories and microprocessors. This should be followed by a return to the traditional pattern of an annual 10-15 percent drop in prices, for the same levels of performance.

From a technological standpoint, the advent of SMD's [surface-mounted device(s)] prefigures revolutionary changes in the technologies of assemblage and of downscaling the size of electronic systems.

--For automated-testing equipment [ATE] systems, the study projects a 15- to 20-percent rise in demand, with a possibility of even a 25-percent increase over 1985, if telecommunications and the industrial sector (that comprised of traditionally mechanical firms which have added control electronics to their equipment) maintain faith in the promise of growth, and if the value of the dollar settles down around the present low rates. The projected market for ATE systems, whose integration with other factory equipment is seen to be increasingly on the rise, exceeds 40 billion lire.

--The survey's findings in regard to laboratory instrumentation include a projected market of 330 billion lire this year, a significant improvement in price/performance ratios, and a future rich in technological innovations following the introduction of instruments in the form of logic cards to be applied to personal computers.

--As regards equipment designed for automated component-assembly, welding, and printed-circuit-washing operations, the very favorable trend observed during 1985 is expected to continue, translating into sales of over 150 billion lire, with significant developments of a technological nature.

#### Symposiums Coupled With the Exposition

The planned extensiveness of the program gave rise to the following symposiums, which roused the attention of a substantial number of participants.

## Official Events

18-19 March

BIAS '86-Microelettronica International Symposium, organized by FAST [Federation of Scientific and Technical Associations], on "Economic and Technical Aspects of Microelectronics in Italy."

20 March

Technical Updating Seminar, organized by the magazine ELETTRONICA OGGI, on the topic "Surface Mounting of Electronic Components: A Qualitative Leap in the Technology of Assemblage."

21 March

Seminar organized by the magazine MEDIA DUEMILA on the topic "When the Computer Meets With the Telephone: Microelectronics and Telecommunications."

## Technical Seminars

19 March

--Melchioni SpA - NEC: "Data Flow Chip for High-Speed Image Processing UPD/281D."

--Inter-Rep SpA:

"Altera: A Desktop Silicon Foundry";

"Sierra Corporation: 1200 BPS Single-Chip Modem."

--Hewlett Packard Italiana SpA: "HP Solutions for Electronic Design."

20 March

--Thermitalia Srl: "Use of Logger Data in Laboratory and Process Instrumentation."

--Hewlett Packard Italiana SpA: "HP's CIM Strategy: Experiments and Proposals."

--Silverstar Ltd. SpA: "New LSI's for Applications in the Telecommunications Sector and for Industrial Applications."

21 March

--Philips SpA, Elcoma Components Division:

"Computer-Controlled TV";



"Full Level-One Feature";

"Zero-Defect Warranty";

"Semicustom Workstation";

"Microcontroller PCB 68070";

"Sensors."

--Pluritec Italia SpA: "Electronic Eyes - Automatic Vision System for Qualitative Control of: Artwork (Mylar/Vetro), Innerlayer Before Lamination, Thick-Film Hybrids, Printed Circuits."

--Kontron SpA:

"New Generation of High-Performance DC/DC Converters in Thick-Film Technology";

"Distributed Power Concepts."

A decided rebound of interest was displayed by the technicians of the electronics sector with regard to the "hot" issues addressed in the first two symposiums held under the auspices of the 20th BIAS-Microelettronica, namely: "Economic and Technical Aspects of Microelectronics in Italy," organized by FAST and held 18-19 March, and "Surface-Mounting of Electronic Components," organized by the specialized magazine ELETTRONICA OGGI, in which 130 qualified technicians, from small-, medium- and large-sized firms, took part.

The extreme interest shown and the proceedings of a round table of extended duration following the conclusion of the latter Seminar attest to the attention being paid by the Italian electronics industry to the most innovative production technologies.

While on the one hand it is customary to often think of Italy as an essentially commercial country when the reference is to advanced-technology products, the fact is that the interest shown in microelectronic products and technologies by the visitors to the BIAS Exposition is proof of an abiding fervor for design and production initiatives--and highly sophisticated ones--which made their appearance in greater concentration among the exhibits by the small- and medium-sized firms as a whole (many of them for the most part unknown), than among those by the better-known (but also less representative of the composition of our advanced-technologies industry) large public- and private-sector firms.

Many perplexities emerged during the symposium on SMD technology. These referred first of all to the levels of investment involved (in the order of billions of lire), rendering these technologies practicable only for

industries with more than merely significant volumes of production. And secondly, they concerned the numerous technical problem areas involved, which for the most part remain unresolved.

It is difficult, therefore, for the small- to medium-sized firm (and the local reality is comprised mainly of small- to medium-sized firms) to line up its course with these techniques. Thus, the role of the technologically-advanced "tertiaries"--of firms, that is, capable of taking on the production requirements of many users and functioning as technological intermediaries and spearheads for the application of new techniques--was termed "fundamental."

What happens "When the Computer Meets With the Telephone?"

A perfect matrimony if one, the other, and the environment that supports them, all functioned as they should.

This is not always the case in the real world. Without a doubt, however, the coming together of these two products--which are expressions of two technologies which until yesterday were heading each its own way--is destined to change the living habits and ways of thinking to which we are accustomed.

This was the topic of the seminar-debate held on 21 March 1986, organized by MEDIA DUEMILA, and participated in by representatives of the manufacturing industry, the public- and private-sector providers of telecommunications services, and the academic world.

The debate, coordinated by Giovanni Giovannini as manager of the sponsoring magazine, was introduced by a member of academia, Egidio Pentiraro of the University of Venice. His introduction consisted of provocative comments, in the constructive sense, and views on the present and future advantages derivable from the combining of the computer with the telephone.

For this matrimony to be fruitful, a number of problems still need to be resolved, concerning the transmission infrastructure, the organizing and managing of data, areas of institutional responsibilities for services, deregulation and reregulation, limitations of a cultural nature, security of information, and international interconnections.

#### Conclusion

The 20th BIAS-Microelettronica Exposition thus fulfilled all the expectations announced for it at the time of the Fall 1984 BIAS, namely: Intensive research and development activity, large-scale investments, the generating of new responsibilities, promotional initiatives more and more in keeping with the needs of the market, and--above all--the will to work and to advance.

From the survey conducted by the BIAS Research Service, a summary of which has been given here, and an integral version of which--as stated above--is

available both in the magazine AUTOMAZIONE E STRUMENTAZIONE and attached to the abstract of this article being distributed by the BIAS Secretariat, has yielded findings which--together with the information contained herein derived as it was from the results of this Exposition of the Fair--cannot fail to provide timely guidelines to all those operating in the field of electronics.

With the doors of BIAS '86 now closed, all sights are being trained on the next Exposition of the Automation and Instrumentation Fair, seeking to foresee its aspect, its content and its results. The outlook--even allowing for our customary restrained optimism--is not disappointing, especially now that the drop in the dollar has produced interesting price changes in the European market.

We take this opportunity to conclude this report with the following item: The BIAS Secretariat will be providing timely information to definitive and potential exhibitors regarding the Fair's programs, and--with equal timeliness--will be sending out forms for participation and all the necessary documentation. To avoid possible delays that could jeopardize participation in successive Expositions, interested firms are urged to give their full consideration to this information as early as possible, and to communicate their intentions directly to the BIAS Secretariat; Viale Premuda, 2; 20129 Milano; tel. nos. (02) 5400196-5400135-5400471; telex 334022 CONSEL I.

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## WEST EUROPE/MICROELECTRONICS

### SGS' DOMESTIC, INTERNATIONAL MARKET SHARE ON INCREASE

Milan AUTOMAZIONE E STRUMENTAZIONE in Italian May 86 p 99

[Text] With consolidated billings totaling 572 billion lire in 1985, the same as for the preceding year, SGS strengthened its position among the leaders of the microelectronics industry worldwide.

In a worldwide semiconductor market which in 1985 suffered what was certainly the most serious crisis in the history of the sector, SGS--whose billings, expressed in dollars, are the equivalent of U.S.\$306 million (\$335 million in 1984)--succeeded in containing its own slump within less than 9 percent--that is, within less than half the drop suffered by the market itself in terms of dollars--while improving its market share for the fifth consecutive year.

In particular, in the integrated-circuits sector--that is to say, the most advanced and most dynamic sector of microelectronics--SGS upped its position by two notches in the world standings, with respect to 1984, going from the 22nd place it occupied in 1980 to 17th place in 1985. In this field, SGS is solidly entrenched in second place among the European producers.

In the overall European semiconductors market, the firm rose two notches to 8th place in absolute standing, with billings totaling 380.7 billion lire (equivalent to U.S.\$203.7 million) and growth exceeding 9 percent in dollars with respect to the previous year.

Domestically, with billings of 112.6 billion lire and a growth of 12.6 percent at the national level, in a market that was at a standstill if not actually in a downhill slide, the firm strengthened its number one standing in the Italian market.

Although believing firmly in the need to expand its internationalization on an ongoing basis, as an essential strategy for amortizing the high costs of research and attaining a sufficient volume for economies of scale, SGS has decided to intensify its presence in Italy. The Agrate-based company is solemnly convinced that--in addition to making its mark in the world market, in which the rivalry between the United States and Japan is becoming more

and more radicalized--it has first and foremost a mission to accomplish, which is to bring technology and growth to its own country.

Being the uncontested leader in Italy cannot constitute a sufficient objective for SGS, which, for this reason, has expanded its holdings by a number of acquisitions grouped under the name "Obiettivo Italia." This project, which is being implemented along four well-defined strategic lines--commercial and marketing, product diversification, controlled access to technology, and data processing and communications--is designed to ensure not only a certain growing share of the market for SGS, but above all, an even more determinative strategic role for the country's electronics industry.

SGS Microelettronica SpA; Via Olivetti, 2; 20041 Agrate Brianza (MI).

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## WEST EUROPE/MICROELECTRONICS

### STATE OF THE ART MEMORY CHIPS FROM SGS

Milan ELETTRONICA OGGI in Italian Sep 86 pp 33-34

[Article: "Nonvolatile Memories by SGS"; first paragraph is ELETTRONICA OGGI introduction]

[Text] Having asked Engr Beverina, memory marketing manager for SGS, to provide us with a general view of SGS's memory chips and its strategies with respect to them, we received a complete picture of SGS's activities in this sector, and have thus been able to assess the state of the art of memory chips "Made in Italy."

#### Rapid Evolution

In the evolution of microelectronics, memory chips have always constituted a model from the standpoint of circuit density, construction technologies and chip size. Referring to Fig 1 [not reproduced], it is evident that processors, in the course of their evolution, have followed memories, although at some distance behind them.

A few examples may serve to illustrate. In 1974, at a time when an RAM like the 2107A contained almost 12,000 transistors, an 8-bit processor such as the 8080 contained less than 6,000 transistors per chip, or half those in a standard memory chip. During the years 1978-79, when the 2732 contained more than 50,000 transistors, a 16-bit processor such as the 8086 contained only slightly more than 30,000 elements; and in 1983, after the first 256-Kbit memories made their appearance, the industry worked with memory chips containing almost 300,000 transistors, while, contemporaneously, an advanced 16-bit processor operated on the basis of not more than 150,000 transistors per chip.

Thus, a circuit-density ratio of 2:1 has consistently characterized the evolving of memories with respect to microprocessors, entrusting to the memory chip the role of vehicle for technologically (even if not structurally) advanced realizations. The progressive downscaling of geometries (graph at bottom of Fig 1) has, in fact, always been introduced first in memories (structurally and functionally simpler to design, because of their high content of repetitive cell arrays), and then in microprocessors, which are unquestionably more complex from a design standpoint.

## SGS Memories

In the evolutionary picture just outlined, it should also be noted that wafer diameters progressed from 4 inches to 6 inches as fast as the silicon technology and availability of suitable processing equipment made it possible. In 1984, Intel became the first integrated-components manufacturer to use a 6-inch wafer in its product lines. In 1985, after a brief intermediate 5-inch phase, a few other manufacturers, particularly the Japanese, also went to 6-inch wafers.

Today, SGS also operates with these diameters, and its 6-inch module--of recent manufacture--is today the first and most advanced at the European level, equipped as is the company with the most sophisticated of equipment for this type of production and operating as it does in a Class 10 clean-room atmosphere. As a support facility for this module--a real jewel as regards technologies and types of equipment used--and for the SGS design activity, the VLSI Research Center is being built at Agrate (alongside the present buildings), a view of which is shown in Fig 2 [not reproduced]. This Center will be one of a number of R & S Centers in Europe and the United States.

For many years, SGS has been building MOS-technology memories (in 1975 it already had in its catalog P-MOS and N-MOS ROM's ranging from 1K to 4K) and, except for a few TTL RAM's, and has advanced through successive stages of technological improvements, quickly abandoning the P-MOS and basing its further advance definitively on the N-channel MOS (in 1978, practically all SGS memories were of the NMOS type, although still in the multiple-voltage phase of the technology). In 1980, SGS produced one of the first electrically erasable memories (the 1-Kbit M120) together with static RAM's, dynamic RAM's, ROM's and EPROM's.

### A Specialization of Its Own

By 1983, however, SGS's strategy with respect to memories had clarified itself: Development of highly-complex chips but of the nonvolatile type; with the disappearance of static and dynamic RAM's, its product portfolio could now accommodate NV-RAM's, ROM's, EPROM's and E<sup>2</sup>PROM's with densities ranging from the M120D's 1 Kb to the EPROM's 64 Kbits and the ROM's 256 Kbits. Its technologies ranged from NMOS-H1 and -H2 (2.5 to 4 microns of gate, 350 to 500 angstroms of oxide) for the ROM's, to NMOS-E, -E1 and -E2 (2 to 4 microns of gate, 700 to 1100 angstroms of oxide, (Fig 3)) for the EPROM's, to NMOS-F1 (3.5 microns, 800 angstroms of oxide and two levels of polysilicon) for the E<sup>2</sup>PROM's.

SGS's decision to direct its productive efforts towards the area of nonvolatile memories enabled the firm to specialize and expand its technological know-how particularly with respect to EPROM's and E<sup>2</sup>PROM's, thus discarding any thought of addressing other typical markets such as that of DRAM's and that of specialized memories (fast RAM's, video and dual-port RAM's, etc).

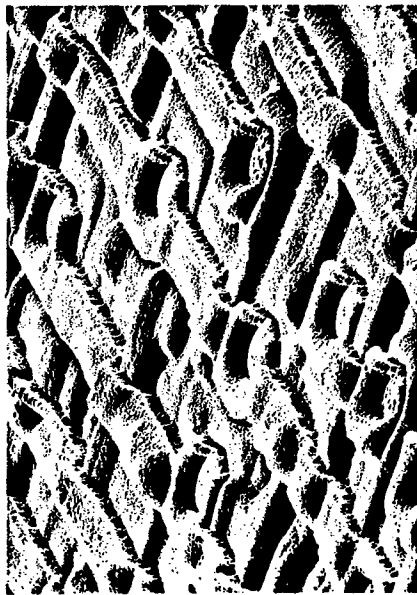


Fig 3 - Electron microscope photo of portion of SGS nonvolatile memory chip surface after protection with P-Vapox.

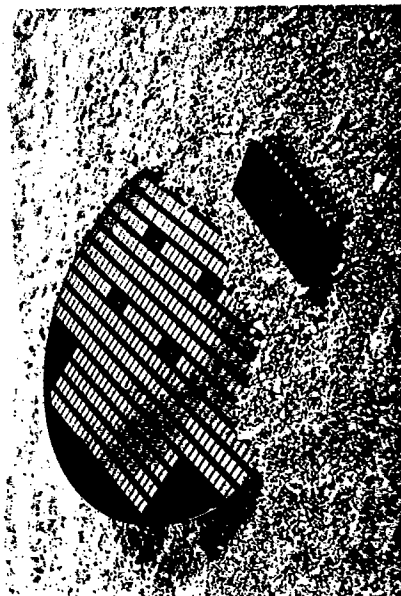


Fig 4 - Package and wafer of SGS 256K, 130mW, 200nsec EPROM.



Fig 5 - Scanning microscope photo of transistor of an SGS 256K EPROM with a gate length of 1.5 micron.



Today, SGS's memory products portfolio includes 16K to 256K mask-ROM's, 16K to 512K UV-EPROM's (Fig 4), and 256-bit to 1-Kbit, 8-pin DIP, serial-access E<sup>2</sup>PROM's. To the technologies already present in 1983, an NMOS-E3 technology has been added which makes use of minimum geometries down to 1.5 microns and 350-angstrom oxides, for EPROM's with a V<sub>pp</sub> of 12.5 volts (Fig 5).

The E<sup>2</sup>PROM's, present now only in three limited-capacity, serial-access versions (the 8671, for example, is an I<sup>2</sup>-bus, principally for TV use), were developed initially by SGS as technological vehicles (in 1984, even a 16-Kbit E<sup>2</sup>PROM, the 2816, appeared), as were the 256K DRAM, which was developed but never put into production.

The experimental 2816, for example, was very useful--Engr Beverina points out--not so much as a base for the development of E<sup>2</sup>PROM's of higher capacity, but rather as a vehicle for the development of high-density EPROM's, and especially for dedicated microprocessors (an example of which is the 38SH70, with shadow-RAM).

SGS's decision in favor of EPROM's is being borne out by, among other things, motivations of another order, such as, for example, the trend on the part of many users towards replacing ROM's with EPROM's and, by no means least, a simple fact: EPROM's today represent a healthy slice of the memory market, and SGS succeeded in capturing a 2 percent share of the world market for non-volatiles in 1985, with its sights set on upping this to 2.5 percent in 1986.

And to conclude: A sector SGS is now eyeing with interest is that of credit cards with built-in memory and processor, requiring the use of ROM, EPROM or E<sup>2</sup>PROM chips of low density but subject to very intensive wear and tear.

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## WESTERN EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

### EUREKA DEVELOPMENT VIEWED WITH HOPE, SKEPTICISM

Helsinki HUFVUDSTADSBLADET in Swedish 12 Dec 86 p 13

[Article by Sigyn Alenius: "Development of Eureka Followed With Skepticism"; first paragraph is HUFVUDSTADSBLADET introduction]

[Text] Copenhagen--"If Europe is not going to be just a kind of technical museum while Japan and the United States roll out on the world's markets at full speed, then forces must be assembled and investments made here and now," said Danish Foreign Minister Uffe Ellemann-Jensen. Eureka says the same thing.

European technology must grab itself by the scruff of the neck--the hard truth is that it is falling far behind.

The Americans no longer believe in the Eureka project as the solution; almost nothing is improving by old Europe gathering firms on their last legs under cover and promising them state support.

Eureka is in the starting pits and the participating states believe in the investment. The name--European Research Cooperation Agency--stands for an organization for research cooperation. Eureka has no money, but a pool of will and plans.

Eureka is the European answer to America's SDI. The European countries were asked if they wanted to join in. France, with its well-known "do-it-myself" philosophy immediately jumped up.

"Europe will not be hooked onto the Americans," said French President Mitterrand, who is the father of the Eureka project.

"Europe will have its own high technology program, and furthermore it will have nothing to do with star wars or space missiles. It will be civilian, and therefore acceptable to all European nations."

No Budget

Included in Eureka today are, besides the EC members, the three Nordic states, Sweden, Norway and Finland, plus Austria, Switzerland and Turkey. The

member council, called the Council of Ministers, decides who can join Eureka. The format of the council reminds one of the Nordic Council's Council of Ministers.

The Eureka Council has neither power nor mandate beyond that granted by the parliaments of the member states to their ministers. Neither does Eureka have its own budget. If funds come to this cooperation in the future, they will be funds invested by the homelands of the participating members. Eureka is a cooperation between companies, not nations.

A mediator--a "marriage bureau"--a door opener, that is what Eureka has been called. Firms which have something to offer can register. Whether they are approved depends on the Council of Ministers, which evaluates their know-how. Experts believe that during the next five years Eureka will conduct research projects amounting to at least 10 billion dollars.

Areas of cooperation include information and communication technology, production techniques, material research, biotechnology, environmental research and traffic engineering--all highly current areas of great practical importance.

Eureka was met with enthusiasm at the start; a cooperation on current high technology questions, an investment in offering competition to the Americans and the Japanese on the world market.

Later critical voices were heard.

Small states are still full of expectations and desire to cooperate, but why should the big states really want to share their knowledge with the small, one could ask? Mainly they see Eureka as a link in building up the free European home market which is having such a difficult time getting started, and as such they approve of Eureka. But when it comes to sharing knowledge, the big countries are most interested in cooperating with each other, meaning the states which are on the same technological level as themselves.

The EC commission, which sits in the Eureka Ministers Council, formally welcomed Eureka as an investment in European cooperation which Eureka is.

In actual practice, however, one gets the impression that Brussels considers Eureka as rather unnecessary. The EC has its own cooperation programs, Esprit (information technology) and Brite (basic industrial research). A third program, Race (telecommunications) is being formed. The EC Commission believes that with these programs the necessary areas of cooperation are covered today.

Besides EC gives money to the cooperation projects. Esprit has a budget of four billion Finnish markkas, Brite has 650 million. Countries outside the EC cannot join in, they say in Brussels, but they add: It is not we who create obstacles for the Swedes and Norwegians, for example, if they would transform their interest in European cooperation which they have so clearly shown lately into concrete membership in EC.

## Money Is Lacking

The weakness in Europe--besides the lack of own resources--is the absence of concrete goals. America's SDI research program follows the American tradition: formulating a goal and then getting started on it. (For example the atomic bomb and the moon landing). Europe does not have this tradition, and will not have it until it is the will of many Europeans.

The Council of Ministers will hold its meeting in Stockholm next month. It will be the fourth meeting. One hundred projects have already been registered and approved. Finland is participating with eight. Among others, the following firms are participating: Vaisala, Nokia, Kone and Valmet.

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## WEST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

### NETHERLANDS PARTICIPATION IN EUREKA, ESPRIT, OTHER PROJECTS

Amsterdam COMPUTABLE in Dutch 19 Sep 86 p 5

[Text] The Hague--The Netherlands is very interested in international high tech cooperation. Thus, it actively supports the goal of a single European market by 1992 (the so-called "White Book" of the European Commission). Minister De Korte is fairly satisfied with the Netherlands' participation in international research projects. The explanatory memorandum to the budget includes separate chapters dedicated to European cooperation in research programs such as EUREKA, ESPRIT, RACE [Research in Advanced Communication Technologies for Europe], BRITE [Basic Research in Industrial Technologies for Europe], and EURAM [European Research on Advanced Materials].

As for EUREKA, 73 projects, including 19 with Netherlands participation, have already been accepted. The minister expects that the 25 million guilders allocated to the Netherlands participants to examine the feasibility of their EUREKA research proposal will be sufficient for 1987. For the following years, he expects he will have to increase this funding, since more small- and medium-sized companies are showing interest in EUREKA.

#### ESPRIT

The Netherlands was involved in 69 of the 425 projects proposed for the ESPRIT program in 1985. In the end the Netherlands is participating in 19 of the 108 projects adopted. De Korte is pleased by the growing number of small companies involved, which increased from five to nine in 1985.

Netherlands companies were involved in 19 of the 83 projects submitted for the RACE program in 1985. Thirteen Netherlands companies are participating in the 30 proposals adopted. The European Commission intends to spend 1 billion ECU (2.5 billion guilders) on the RACE program by 1991.

In the BRITE program 100 project proposals out of 559 have been approved. The European Commission has earmarked 125 million ECU (325 million guilders) to the BRITE program through the end of 1988. Minister De Korte

reports that at least one Netherlands company is participating in 25 percent of the projects. Many good proposals had to be rejected for financial reasons only, and according to De Korte, the European Commission is now examining the possibility of a second round for BRITE with a much larger budget.

The EURAM program has a 30-million ECU budget through 1989. This program involves new materials research and De Korte is committed to a large Netherlands participation.

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## WEST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

### NETHERLANDS GOVERNMENT INCREASES R&D BUDGET

Rotterdam NRC HANDELSBLAD in Dutch 16 Sep 86 p 23

[Text] This year science policy has received the "priority" label. The present cabinet attaches great importance to research and technology as a means of strengthening and revitalizing the economy.

Thus, about 55 million guilders more will be allocated to scientific research in 1987 than in 1986. Additional funding has also been earmarked for basic and industrial research. Next year the business community is likely to increase research spending by 220 million guilders.

Last year's OECD [Organization for Economic Cooperation and Development] status report on Netherlands research and technology policy has greatly influenced the decision not to retrench but rather to spend more on technology research. The OECD expressed concern about the fact that research expenditure in the Netherlands has slowly but surely been losing ground compared to other industrialized countries. For years the Netherlands expenditure has fluctuated around 2 percent of the gross national product (GNP), while in neighboring countries it has gradually increased to about 2.7 percent of the GNP.

"The OECD report made it considerably easier for us to avoid cuts," says the minister of science and education, Deetman. The increase in the government budget together with the growth of business research spending means that next year the total research expenditure in the Netherlands will increase to about 2.2 percent of the GNP. "That is still not very much," Deetman admits, "but it took a lot of hard work and the result is not without merit. Nowadays every extra million hurts. I expect the increase to continue in 1988."

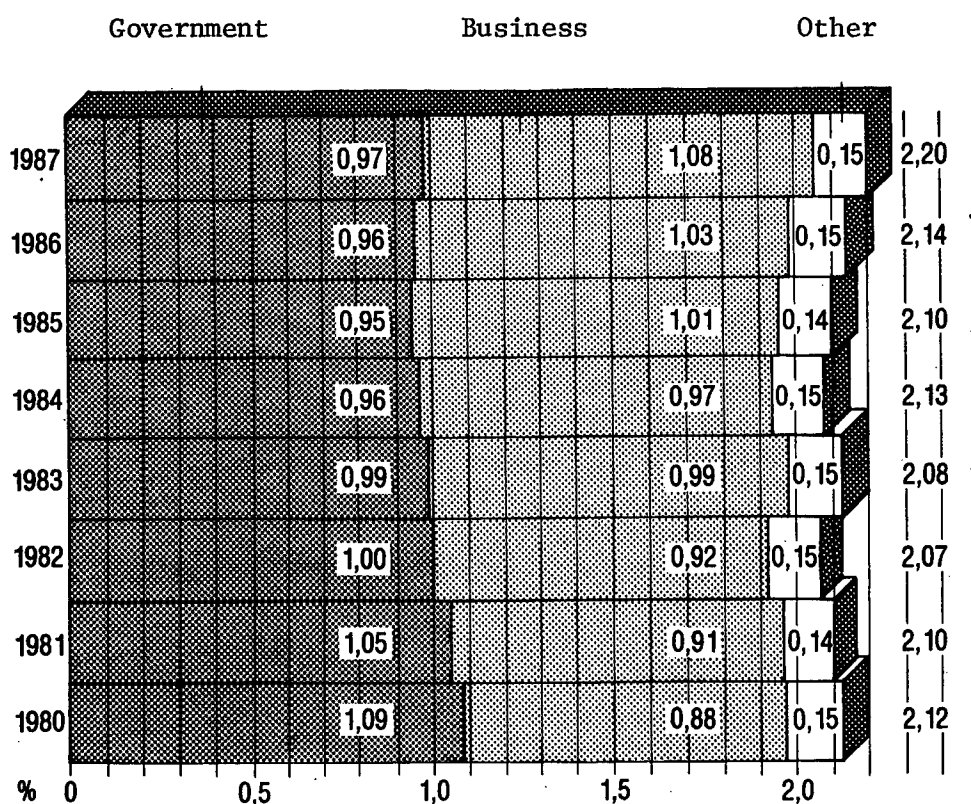
OECD's cry of alarm was also reflected in the allocation of the additional funding. According to OECD investigators, research equipment in the Netherlands is generally obsolete. A "directed equipment plan" for the replacement of equipment will be published in 1987. An additional 25 million guilders has been put aside for the purchase of very expensive equipment.

In 1987 university research funding will be decreased by 20 million guilders, whereas that of the other research institutes will be increased by 75 million. In 1987 the large technology institutes and the TNO [Netherlands Central Organization for Applied Natural Science Research] will be placed under the supervision of the still to be established technology institute, which is to function

"at an arm's length" from the government. This institute will also keep an eye on the financial relations among the institutes. Since Deetman fears that smaller institutes may "fall between the cracks," an official note on their status will be published next year.

The science policy community has also given the necessary attention to the internationalization of Netherlands research. For 1987, 1.2 million guilders has been put aside to encourage the exchange of scientists and scientific data with foreign countries. This amount is due to reach 5.5 million by 1991.

Table 1. Evolution of Total Research Expenditure (as a percentage of the GNP)  
(Source: CBS [Central Statistics Office])



While other industrialized countries have gradually increased their research expenditure to 2.7 percent of the GNP over the last few years, Netherlands research expenditure remained in the region of 2 percent. For 1987 it is expected to increase to 2.2 percent of the GNP; this increase should continue over the next few years. The largest part of this growth is provided by the business community. Actual research spending in the Netherlands amounts to 8.7 billion by the business community.

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## WEST EUROPE/TECHNOLOGY TRANSFER

### ITALCOM IN YUGOSLAVIA

Milan AUTOMAZIONE E STRUMENTAZIONE in Italian May 86 pp 99-100

[Text] The forming of Ei Digital under the joint venture between, on the one hand, Italcom, the majority shareholder in Italtel (Iri-Stet Group), in which GTE and Telettra are also shareholders, and, on the other hand, Elektronska Industrija Nis, one of the principal Yugoslav industrial groups in the electronics sector, has been officially announced. Ei Digital will produce and commercialize in Yugoslavia the exchanges of the Italian national digital--switched public telecommunications system.

The agreement, which stipulates terms, conditions and developmental timetable of the new firm, was signed by Marisa Bellisario, managing director of Italtel; Sergio Treves, president and managing of GTE Telecomunicazioni; and Ljubisa Igic, president of the Elektronska Industrija group.

The system, based on a distributed control architecture, considered today to be among the most innovative, is in service in Italy with more than 150 exchanges and is predesigned to evolve towards the ISDN [Integrated Services Digital Network].

Italcom, with a 35-percent share of the joint venture, will furnish the licenses and production facilities for the manufacture of the exchanges; Elektronska Industrija will provide the necessary infrastructures and local facilities and the working capital for the startup of the firm. The research needed to adapt the communications systems to the Yugoslav market will be done jointly by Italcom and Elektronska Industrija. Investments totaling around \$12 million are planned for the production, in Yugoslavia, of the Italian digital switching system.

The Yugoslav market is of particular interest to the Italian telecommunications industry, given the close relations between the two countries. By the end of the 1986-1990 five-year period, Ei Digital is expected to be in a position to acquire 40 percent of the public digital switching sector in Yugoslavia (a share equivalent to an average annual volume of 100,000 lines).

Italtel SpA; Via A. di Toqueville, 13; 20154 Milano.

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## LATIN AMERICA/FACTORY AUTOMATION

### AUTOMATION SEMINARS SHOW LEVEL OF BRAZILIAN SOPHISTICATION

Sao Paulo MAQUINAS E METAIS in Portuguese Jul 86 pp 50-58

[Text] "Industrial automation is increasingly being viewed as a need and ceases to be a taboo because companies have now become aware that they need to be competitive in the market in terms of quality, complexity and precision," says the president of SOBRACON--Brazilian Numerical Control Society--Thomas Lanz, to justify the great number of applications for "vacancies" for participation in the event the organization is sponsoring in August in the Sao Paulo (SP) Hilton Hotel.

This is the 6th Seminar on Numerical Controls in Brazil, an event held annually, which for the second consecutive time takes place together with the International Industrial Automation Exposition, and for the third time, with EXPOCON--Exposition of Numerical Controls and Related Items.

According to him, participation by technical personnel in the area of automation has been growing year after year at the same time that demand for spaces for stands by companies and industries of the sector increases. "That is a demonstration that the event is already definitively established and fills the expectations of the professionals of industrial automation."

Moreover, with an overall number of numerical control machines, which now reaches 1,700 units in the country, and nearly 80 CAD/CAM units, it is not unusual that there is a great demand for information on technologies, uses and operations of those products. Keeping in mind the trend towards the increase in installations of numerical control units--estimated by SOBRACON at 55 percent this year, 35 percent in 1987 and 20 percent in 1990, a declining percentage rate due to a restrained demand in recent years and which now is giving signs of total recovery--it is not strange that the companies that make and sell numerical controls and related items have a special interest in having their stands installed at an event specifically aimed at the users of those products.

"To have an idea, while on 15 July last year we had 24 'assured' registrations for the seminar, this year on the same date that number was already 140 registrants, which means that there was an increase of more than six times between one event and the other," reported the executive administrator of the organization, Paulo Bruin. "There were companies which had to stay

out of EXPOCON No 3, and many of those that have stands are complaining about their size, which is quite small. What has happened is that we could not find a site that could contain all the exhibitors and all participants because the configuration of the event requires a building with two auditoriums for the holding of national and international lectures, each of them with a capacity for nearly 400 participants, which means a total of 800 seats, a restaurant for all of them plus an exposition," said Bruin, who estimates that there will be nearly 700 participants this year.

On the other hand, Lanz said: "SOBRACON is a nonprofit technical-scientific organization whose seminars are designed for the exchange of information among manufacturers, users and research bodies in the area of industrial automation, with the participation of lecturers from abroad, who bring us what there is new on the international market. It is precisely for this reason that high-level events must be held, but with minimally reasonable costs." After all, according to him, the organization holds its events without sponsors, charging the participants and exhibitors fees that do not permit the leasing of sophisticated and spacious buildings as some of them want. "It saddens us, but at least for the time being what we can offer in terms of a building is this: Something that can contain a technical exhibit, without great shows and with standardized stands, in one of the better hotels of Sao Paulo."

The president of SOBRACON also pointed out as another indication that the event has been established and improved, the number of technical papers sent to the organization to be evaluated and possibly presented in the seminar. "This year we received a volume of papers three times greater than last year and because of that the present program is of a very high level," he asserted.

#### Lectures at the Seminar

The seminar will have two different plenary sessions: One for lectures of national authors and the other for the international. The program was established by SOBRACON in such a way that the participants will have easy access to auditoriums and there will be no conflicts in scheduling among the lectures. There is even a display showing the presentation of papers, aimed precisely at insuring that everyone will have a chance to participate in all the sessions, whether they be international or Brazilian.

Following are short descriptions of what each lecture will be (with the exception of the international lectures, the list of which was not provided by the sponsoring body of the event in time to be included in this issue of MM].

"The Training of Higher Level Personnel in the Area of Software for Industrial Automation," a paper by Waldo Rolim de Moraes Filho of the Department of Applied Mathematics of the Institute of Mathematics and Statistics of the USP [University of Sao Paulo], proposes a program for the training of post-graduate personnel in the area of software for industrial automation,

stipulating a cycle of adaptation consisting of several options, depending on the previous experience of the professional to be trained. According to him, it is a multidiscipline training that should include a solid electro-electronics, computer science, industrial processes, design, and computer assisted design and manufacture. Because this is a need of industry in the short and medium term, for professionals with this type of training, the proposal is for postgraduate courses, since training for the training of professionals at the graduate level is necessarily very long.

Mauricio Fantinato of the Robert Bosch Company Ltd. speaks in "From Manual Scheduling to DNC [Development of Numerical Controls]: Transition after the Implantation of a CAD/CAM System," about the experience of the Bosch Company itself with that transition. During the course of the presentation, comments were made on some of the main problems encountered by the company in making the numerical control system efficient and operative, and the solutions for them. Slides were shown on the utilization of the system with the solutions proposed: creation and check of the milling phases of test parts and the milling of those parts.

Planned in three phases, the talk "Development of Support Software for Aiding Industrial Automation," by Dagoberto Salles Neto and Fernando Ricardo of Robotec Automacao Industrial Ltda., deals with systems for the programing of programable controllers, the development of software for analysis and verification of automations for manufacturing systems and uses of artificial intelligence systems for the correction of failures and the adoption of decisions in an automated assembly line.

"The selection of conditions for cutting is done daily by operators, programers or process analysts, however, in the majority of cases, without any system or evaluation. On that basis, Abelardo de Queiroz, Lourival Boehs and Sergio de Azeredo Leao Coutinho of the UFSC--Federal University of Santa Catarina, studied and developed a system for selection and optimization of conditions for milling that is based on a data bank contained in a microcomputer.

The software in question, called "Optimus," was initially developed for the lathe-working process but it now covers a large part of milling materials combinations and of hard metal pellets available in the Brazilian market. The "Optimus," according to the authors of the paper "Selection of Optimum Conditions for Cutting: Supported Software," was conceived and structured for operation by persons unskilled in computer operations, "allowing easy access not only for operation but for the updating and implementation of new data."

A joint application of Process Control (PC) and microcomputer in the control of machines that need the man-machine interaction for obtaining better information/visualization with respect to production, quality and diagnosis, in addition to aspects of interconnection in a communications network is, in short, the central point of the lecture "Programable Logic Controllers Used in Manufacturing," by Jose J. de Locio Silva and Djalma Foot Filho of Metal Leve Controles, who also defend the thesis that "The development that has

taken place in recent years, made programable controls and microcomputers more accessible in terms of cost and with a reliable performance in an industrial environment."

Carlos Flesch and Juan Sotuyo of CERTI--Regional Data Processing Technology of Santa Catarina--presented the conclusions and recommendations they arrived at after a study of the trend toward adopting quality control techniques with respect to the manufacturing process more extensively. According to them, "The use of statistical techniques have shown themselves to be of fundamental importance because it allows a logical and systematic evaluation of information and helps efficiently in the determination of the stability of the process, capability of satisfying the requirements of production and the causes of possible problems."

The paper by CERTI technicians, "Automation of the Static Control of the Manufacturing Process," presents a solution for the installation of automated static control in production lines and the various configurations for the collection of data and centralization of information.

In "Technical Criteria for the Selection of Industrial Robots," Heitor Caulliraux (UFRJ [Federal University of Rio de Janeiro]) and Luiz Meirelles (PUC/RJ [Pontifical Catholic University of Rio de Janeiro]) tell of a method based on the definition of the tasks to be performed by the robot; on the establishment of basic restrictions--work load, precision of positioning and repetition--and on the establishment of the criterion for evaluating the robot. According to them, the evaluation criterion is actually a two-variable mathematical function: consumption of energy and time of execution of tasks. The balance between them establishes which piece of equipment is more suited for the activities for which it is destined.

Marcelo Correa and Fernando Pitanga, of Maxitec S.A. speak of "The Problem of Training Personnel in the Area of Computerized Numerical Controls," with emphasis on the need for certain educational prerequisites for the training of personnel, in addition to making businessmen aware that good courses on CNC [computerized numerical controls] should mean 2 to 3 months of on-the-job training and that there is "a need for new managerial development for a better integration into industrial automation via the CNC's within the context of the search for excellence."

The talk "Test Equipment for Microcomputerized Electronic Modules" by Eduardo Porto of Chronos Automacao e Controle Industrial, describes a dedicated microcomputer capable of testing installed printed circuit modules, issuing reports, making approval judgements pursuant to programmed criteria, and allowing the monitoring of tests by the operator. According to the author, the equipment is used in the performance of tests on digital and analogic modules immediately after installation in a production line.

In what way do the trends in the international industry of manufacturing automation--CN, robots and CAD [numerical controls, robots and computer assisted design]--condition the installation and development of this industry

in the country? Mariano Laplane, Carlos K.L. Ferreira and Luciana T. Almeida, all of Unicamp [University of Campinas], ask this question in "Production and International Dissemination of MFCN [numerically controlled manufacturing modules], industrial robots and CAD: Questions for Brazil." According to them, for each of those pieces of equipment "the present situation and the prospects for the market and industry are examined, as well as the trends toward technological innovations and the role of state policies," covering the United States of America, Japan and Europe. They believe that the dominant trends in the advanced countries establish fundamental requirements of efficiency in the competitive production of those pieces of equipment in Brazil; they create openings in the market, pose alternatives of growth to national companies, and establish the possibilities of access to technologies developed abroad.

"Automatic Programing of CN machines in National Microcomputers: Personalized 'Postprocessors,'" is a talk in which Graziano Saibene, Guenther Leyen, Hudson Silva and Luiz Thomza of Promacon Informatica para Automacion Ltda., establish the difference between manual programing and automated programing, and they justify the need for the existence of a postprocessor for the generation of controls aimed at a specific machine. The paper also has the phases of preparation of a postprocessor; a demonstration of the use of that item and it deals with the economic aspects of the use of automatic CN programing microcomputerized systems.

Raad Qassim and Marcelo Mallat, of the UFRJ and CNEN [National Commission for Nuclear Energy], respectively, present "A Software Package for the Determination of the Reliability and Availability of Industrial Plants," which is aimed at the evaluation of several maintenance procedures and contains examples of tests in the chemical industry.

The article by Ricardo Sarmento Costa and Eduardo Galvao Moura Jardim of the National Institute of Technology [INT] titled "The Use of Computational Simulation in Production Planning and Control," emphasizes the usefulness of computational simulation models in management of production, keeping in mind the spread of microcomputers throughout industry and the interest in reducing the gap between theory and practice in the field of operational research. The authors point out some relevant topics on this method, including basic concepts, computational aspects, new perspectives and a critical analysis of their effectiveness, in addition to dealing with the shaping of the structures of production in lots, presenting in this context a method for the development of computational simulation systems. According to them, the use of this technique provides real gains in productivity.

"The modern CNC's [numerical control centers] for lathes allow the control of up to six spindles, which many times insure the complete machining of very complex parts." This statement by Alfredo Ferrari of Traubomatic Ltda., whose talk ("CNC Lathes with up to 6 spindles controlled") presents the construction and application characteristics of CNC lathes built with the possibility of having elements controlled in up to six spindles by the CNC.

Plinio Stange of the Institute of Automation of the CTI brings to the seminar "A Proposal for Grouping Parts in Families with the Help of a Computer," which actually is an algorism that allows the classification of parts to be produced in "families," according to the technological criteria of the group. Numerical examples are presented, resolved pursuant to the algorism proposed, and the results are analyzed in a critical manner.

The paper, "The Present State of Electrical Machine Applications in Robotics and Machine Tools," by H. Cunha Jr of the USP/Sao Carlos, makes a comparative study of the various structures of electric motors, comments on, and makes a summary of, the various options for electric drives, their advantages and their problems.

In "Specialist Systems, a New Tool for Industrial Automation," the author, Nizam Omar of the ITA [Technical Institute of Aeronautics], speaks on what the specialist systems (SE) are, how they came about and what the mathematical bases are that insure the validity of their results. Some SE's are shown in operation and there is the proposal that they be used in industrial automation. The talk is arranged in the following manner: Difference between conventional programming and SE; logic bases and mathematics; organization and techniques of construction; characteristics problems of SE; languages and tools for construction, and the future of the SE's, among others.

"In order for automation of milling and production processes, determined by the support of computers for the technology of numerical control, to reach its objective of a high degree of productivity with quality and flexibility, it is imperative that its potentials be completely employed, including from the point of view of milling, which is not always easily accomplished," say Luiz Airton Consalter of the Tupy Foundation Research Center, and Lourival Boehs and Aureo Campos Ferreira, both of Grucon/UFSC, in "Programming of CN Machines Using High Level Language Supported by a Data Bank."

According to them, in Brazil, generally, limitations in this particular happen mainly due to factors such as the small number of research projects on milling aimed at establishing optimized cutting parameters--which are indispensable for a good CN program--and the additional difficulties caused by the constant development in the field of the materials of parts and tools. That is the reason for the need of a data bank (where milling data coming from tests with national parts materials, tools and machine tools are stored) that uses a standardized methodology. That is why the talk presents the aspects related to the introduction and use of the data bank in the EXAPT-2-lathe-work-process and it discusses the automatic establishment of milling conditions, the preparation of the program of the part and its manufacture.

A real experience undergone by Bardella S.A. is the subject of "Report by One User on the Implantation and Use of Manual and Assisted Programing," by Giuseppe Orsatti and Rubens Benetti. The studies are carefully reported as are the economic justifications and the results of that experience.

Ricardo Menna Barreto Felizzola of the UFRS and of Alsus Sistemas de Informatica, makes a report on "Utilization of a Network of Programable Controls for the Control of Production and Maintenance," which is called SSM--Manufacturing Supervision System. This is an SSM plan consisting of a network of CP's controlled by an IBM compatible 16-bit microcomputer, which has as a basic premise that of making possible the supervision of up to 31 machines automated by CP's and interconnected to the micro.

The Marposs-Contar System is shown in "Systems for Measuring During the Process for Lathes, Milling Machines and CNC Milling Centers" by Ivo de Abreu of Marpos Ltda. According to him, "With the introduction of that system of measuring during the process, which operates together with the CNC of the machine, there is finally at hand a non assisted system of production."

"The year 1986 has been showing itself to be the year in which plans for systems of interconnection, industrial automation and even digital instrumentation will be integrated, interlinked in a system of data and communications rings via protocols of various types." This statement is defended by David Jugend of Euro Systems Engenharia Ltda., who foresees the activities of those systems in the integration of the most diverse equipment, existing or to be developed, "in such a way as to eliminate for once and for all the isolated systems for the control of specific operations." His talk: "Control of Processes of the Future: Integration of Systems of Interconnection and Control of Networks," reveals the expectations for a not too distant future, but very different than the present time, with the launching of new systems into the market "that are going to make solutions of supervision and control viable for all the needs of the Brazilian industrial complex."

The main topic of "Numerical Controls Used in Plastic Injecting Machines" is plastic injecting machines controlled numerically, a paper presented by Jose C. Romi of Industrias Romi S.A., which deals with the following subjects: What a plastic injector is; history of controls in plastic injectors and the development of the injection process; why CNC is used in injectors; the goal of an economic allocation and market trends (metal x plastics, equipment and processes).

In addition to these talks, the following were among the national papers presented, but whose information was not provided to MM in time for this edition: "Social Aspects of Industrial Automation," by Mario Salerno of the DIEESE [Interunion Department of Statistics and Socioeconomic Studies]; "Use of a CAD/CAM System for CN Machines (Basic Concepts)" by Alejandro A. Knorr of Cumpugraf Servicos Ltda., and "Use of Bar Code in Industrial Automation by Manoel L. Leao of the UFRS [Federal University of Rio Grande do Sul]).



Who is at the EXPOCON

The 3rd EXPOCON--Exposition of Numerical Controls and Correlated Items is not going to have as many exhibitors as those who are present at SOBRACON. The reason is that there is not enough space available for all of them at the Hilton Hotel installations, where the event is being held in Sao Paulo. This time, the appeal by the association saying that the companies that intended to have a stand at the exposition should reserve their spaces beforehand so that they could insure their participation was more than ever absolutely sincere: Those who did not do so were left out, even though SOBRACON made every effort possible to prevent it.

MM spoke with each of the exhibitors--and no one can complain about that--about what they were showing at the EXPOCON this year.

Altus Sistemas de Informatica Ltda., of Porto Alegre, Rio Grande do Sul, according to Paulo J Bier, is going to show a distributed supervision and control system. Its novelty--subject of the talk that a company technician is presenting at the seminar--is the integration of programable controls in networks "which makes viable the isolated control of the machine or process," says Bier. According to him, each point of the process can also be integrated and thus control an entire factory by means of several CP's.

In addition to that, the company "will be presenting the mini CP AL-500 to the market, a novelty because of its potential, since it has display and analogic inputs and outputs." Bier also spoke of the company's CN, which is already under negotiations with the SEI and about which Altus is beginning to talk in the EXPOCON, revealing it. "The equipment should be on the market within 18 months. Its technology is entirely national and, actually, it is being conceived because the market itself requested it, since there is a restrained demand which has resulted in a lack of CN's," he said, adding that this CN "is going to make it possible for a company that has an Altus CP to integrate it better with an Altus numerical control.

The Engineering Teaching Foundation in Santa Catarina of Florianopolis, Santa Catarina, which has always had a very busy stand in previous events, is taking demonstrations of the research work it performs and of the services it provides, in addition to the training it does to the Hilton.

Professor Aureo G. Ferreira of the foundation reported that ongoing research by the organization is aimed at areas of development of software, machines, equipment and hardware.

"In the area of software we are developing and working with several systems for resolving problems related to CAM. Within that there are also two lines of writing CN programs; graphic simulation of tools and automatic preparation of the program, which can be stored by means of punched tapes or diskettes," he explained.

The foundation is also involved in development of software for the sectors of footwear and clothing, whose aim is the optimum use of raw materials. In the line of hardware, the principal work is concentrated on the modernization of the old CN machines, which because of a lack of space will be demonstrated in the stand by means of posters. "We are taking machines whose CN's are already obsolete but whose mechanical parts are still in good condition and renovating all the control parts, all the electronic parts, and already there are two machines undergoing tests, one Nardini and the other a Pratt Whitney," said Aureo C. Ferreira, who is optimistic about the results the tests are showing.

Optimism is also a word that Oclesio Pivato of Maquinas Operatrizes Monarch Ltda., of Sao Paulo has been using frequently lately. "For our company, which imports everything, the market after being somewhat closed is opening up more because of the delivery dates of national machines, which sometimes are up to 18 months. Users need to produce more, however, the manufacturers of national machines are not able to satisfy the demand in the short term," he said. In view of that, Pivato declared that he is waiting for a major opening for importers and emphasized that in this respect the authorities have to be more benevolent and attend to the requests of machine users. "Indeed I believe that there will be this opening to benefit national users in the example of what is taking place in the sector of machines for the treatment of leather, solution for which was the abolishment of import quotas due to the urgency of national production for the foreign market."

At the Monarch stand, video displays and posters are showing vertical CN bench lathes for working with sheets, between centers and bars, with plates with a diameter of 150 to 710 mm, drill with a spindle-arbor from 40 to 330 mm, precision of .005 microns or less. The CNC can be either a GE 200 or Fanuc 11TA.

Other equipment is: Vertical lathes with tables of 900 to 3600 mm in diameter, with automatic change of up to 200 tools, monoblock or two assemblies, palletized or unpalletized, with options of a rotary headstock, rotary tools and lateral travelling beds; horizontal milling centers with 50 tools, 15 Hp, for work of up to 700x700x800mm in bulk, up to 6 spindles, with models with flat or rotary beds; vertical milling centers with strokes varying from 450x760mm to 910x288 mm, precision of .005 microns, 5200 rpm, 60 tools, computerized activation of the spindle-arbor, AC servo, three rectangular guides, and conical bearings for high rigidity.

Something which should attract the attention of the public greatly is the demonstrations of the Monarch manufacturing cells, which use lathes or milling centers, have robotized systems of the Alpha type for loading and unloading, palletized systems with piling capabilities or transporters for the integration of several machines, with sensors for automatic centering, automatic compensations for wearing away of tools, automatic tool preset, measurements during processes or post milling, with the necessary corrections of measurements made automatically.

Promacon Informatica para Automacion of Rio de Janeiro (RJ), a "software house," created recently by technicians who had already been participating in activities of programs of international technical cooperation developed in the field of CN as members of the personnel of the Euvaldo Lodi Technology Center of Senai/DR-RJ, is going to present a series of user programs devoted to the solution of problems having to do with programming of CN machine tools.

According to Graziano Saibene of the company, this is a package of modular type with a first part--the processor--devoted to the geometric interpretation of the part to be milled. It develops the process of geometric and technological calculations, producing an intermediate solution separated from the particular characteristics and requirements of each machine tool. The processor is available in different models--ATP/T, ATP/2D, and ATP/3D--which provide solutions for problems of milling in lathes, milling machines, milling centers, punches, oxacetylene cutting machines, edge electroerosion, and others.

A second module--the post processor--personalizes the standard solution generated by the first in terms of the specific characteristics of a certain machine tool and its respective control unit. Other modules make it possible to record the program in the language of the machine tool and to transmit it directly to the memory of the control unit by means of diskettes, tapes or other support method. There is also a specific program called ATPE which allows the writing in the computer of part-programs, as well as programs for machine tools that must be modified, renumbered, and so forth.

Promacon also developed special programs such as that devoted to edge electroerosion machining of the Charmilles Robofil type for the study of cogwheels and gears, producing programs for milling them. Another is a program which makes possible the viewing of the upper and lower profiles in a four spindle milling job and another which joins two different profiles in two different planes with a series of straight lines, calculates the angles of those straight lines and in that way can visually and analytically control the progressive inclination of the edge.

"Also available are CAD programs linked directly to the software for automatic programming the milling of a part designed with computer assistance by means of an interface package, making up a flexible CAD/CAM package," reported Saibene, explaining that all Promacon products work in national equipment (16-bit microcomputers and IBM-PC compatible peripherals).

While in the seminar, the Metal Level Controle Eletronicos Company of Sao Paulo presents a talk on one use of programmable controls in manufacturing, in EXPOCON it will be showing its equipment in the CLP line, of which the CLP-2/30 is the star of the company. "The CLP-2/30 is a large programmable control that has 896 inputs and outputs with the possibility of a remote configuration with another 896 inputs and another 896 outputs, whose storage capacity runs from 2K to 16K words of instruction, expandable in the field," explained Clovis Ferratoni of Metal Leve.

The company's line also includes the CLP-2/15 and the CLP-2/20 of smaller size. "Metal Leve makes a study together with the customer so that they may specify the equipment needed by his company, which means that before the sale there is a certain amount of work, including training, and after that, technical assistance. In our company there is always a shift available to serve the users 24 hours a day, including weekends and holidays," declared Ferratoní.

According to him, "Metal Leve is not a leader in the market without a reason. There is a large amount of work in the development of high technological level programable controls and also the training of the user plus technical assistance and field engineering and applications engineering." He also said: "The user never performs the first operation of the equipment alone. A field engineer is the one who does that, preparing the customer in such a way that he will have no problems with its operation. All that is done in addition to specific applications engineering for each customer."

Master Controle Dimensional S/A is taking a multiuser version of its Microline system to EXPOCON, which on a reduced scale is going to show how it is possible to monitor several measuring stations, collecting data remotely and storing it or making statistical calculations such as averaging, deviation from pattern, block diagrams, dispersion curves of samples, control cards and other data, all of use in the application of preventive quality control methods.

"The installation is made up of a dedicated computer master station, which is the Master Microline linked to several measuring analogic amplifiers, in other words, the Master CM-3000 electronics column," said Sidney Coldibelli of the company, explaining also that those amplifiers shall be responsible for the measurement and indication of the "pass/no pass" condition of the parts produced, and will also send data by means of an analogic output to the central system which is going to perform the calculations indicated "simultaneously, that is, as soon as the process takes place, making possible the adoption of decisions much faster than traditional control processes allow with cards," he declared.

Compugraf Sistemas e Tecnologia of Sao Paulo (SP) is showing the Euclid CAD/CAM system at EXPOCON. The system was developed by Matra Datavision of France and it is being made nationally by the Sao Paulo company.

"The optimization required for the link that is established between an initial idea and the final product," according to Alex Arjona of Compugraf, "is possible only with integrated CAD/CAM systems such as the Euclid, which was already successfully presented at the Second Conai in November last year and is now also being shown in EXPOCON."

A three dimensional system of solids, the Euclid consists of one or more graphic stations linked to an Elebra or IBM computer. "With it you can calculate surfaces, volumes, finite, thermal and other units," said Arjona,

who also said that because it is integrated the system allows all those data to be passed directly to the numerical control program, "thus closing the cycle of industrial automation."

The system already has a Portuguese language that allows the designer to deal with a practically real model, representing that which is desired and giving answers on physical and geometric aspects, also allowing separation into component parts; cutting, measuring weight and volume, for example,

Of the products shown by Marpossa Aparelhos Eletronicos de Medicao Ltda., the most outstanding is its Contar series for measuring during process. It is a system made up of a multidirectional contact sensor, generally installed on the tool-bearing turret of the machine, an inductive transmission system and an electronic interface for passing the signal of the contact to the logic of the CNC.

Already included in the Contar system are sensors which are almost completely made nationally, asserted Ivo Corradi of the company, sensors named A94, A95 and A99.

The A94 has an axis and a half of movement with a repetition of  $\pm 1$  one, tested at speeds of from 2 to 300 mm/min. Designed for the control of parts in CNC lathes and installed in the tool turret, the A94 has a trajectory after contact in the direction X of  $\pm 2$ mm.

The A95, also with a repetition rate of  $\pm 1$  one, is designed for control of tools despite the fact that it makes measurements of parts. It has two axes. Its trajectory after contact is in the directions X and Y is of  $\pm 4$ mm.

For milling centers, the most indicated sensor is the A99 with two and one-half axes. The A94 and A95 transfer the contact signal to Interface E-32, also made by Marposs, to make that signal compatible with the logic of the CN.

Ennio Crispino of Traubomatic Industria e Comercio Ltda., of Sao Paulo (SP), pointing out the difficulty of bringing heavy equipment such as CNC lathes and milling machines to the stand at the Hilton, organized the exhibit by the company with items such as video cassettes, television sets and others. "We also have a CN Traub TX-8 simulator that allows making tests with a CNC program of a part to be milled subsequently, check the shape of a finished part, detect the possibility of contact between the tool and the holding device or back center, contact between the tool and the unfinished part, in short, a visual presentation which allows the immediate adoption of decisions when necessary," he said.

The company intends to disseminate information among the visitors on the machine tools it manufacturers, which are: Universal lathe CNC TND-360; automatic lathes CNC-TNS42/60; automatic lathe CNC TNS30D with two turrets; automatic lathe CNC TNA 480 and TNA 80D with one or two turrets; and universal milling machine CN with 4 spindles, of the SHW branch, which has a

milling table controlled by a coordinated and universal milling table. By means of TV and videos, a visitor may learn technical details for the application of those machines in the production of high precision, complex parts.

Moreover, Traub places at the disposal of the public during the exhibit, technical articles on the technology of CN and also books on the subject, written by the EPU with the collaboration of the technical team of the company.

Also seeking to show their products by means of graphic devices, the Romi S.A. Company of Sao Paulo (SP), according to Paulo de Toledo Ferreira, is going to display its series CNC Mach-3, which has three models. The Romi Mach-3L is a complete system with two spindles and another spindle-arbor for milling machines, and consists of graphic devices for the viewing of the course of the tool, total compensation of the radius of the point of the tool, programed areas of failure and safety, complete velocities and advances, programing of diameter, as well as of radius, unitary block cycles (fixed cycles) for boring, lathing, surfacing, tapping and dieing, including threads with multiple entries, with radial threads, conical threads in automatic cycle or with programed removal for each step.

The Romi Mach-3MP CNC is a control of 3, 4, 5 or 6 spindles for a milling machine or milling center, while the Mach-3GP CNC is a control of 1,2,3,4,5 or 6 spindles for applications such as robotization, automation, welding, laser cutting, boring and others. All those CNC's, according to the manufacturer, were conceived for installation as plug-in units, thus facilitating their installation or possible replacement.

Sisgraph S.A. of Sao Paulo (SP), which assimilated the technology of Intergraph Company, shows its stand-alone graphic station Interpro 32, a high resolution unit, which connected to large size equipment and devices manufactured in Brazil, becomes an interactive and complete graphic system.

According to Silvio Steimberg of Sisgraph, the company "made the most complete interactive integrated CAD/CAE/CAM system. It is an open system that allows the user to adapt or create his own applications and also makes possible its connection in network by means of computer resources he may already have," he explained.

Sisgraph showed all the products and services it is able to provide in the areas of machining, civil engineering, industrial designs, architecture, mapping and others at EXPOCON.

"Our hardware, software, applications and training support structure insures the operativeness of our CAD/CAM system, a segment of the market in which we are the leader," said Steimberg.

Villares Informatica, of Industrias Villares S.A. is also going to be at EXPOCON with its entire line of systems and services of CAD/CEA/CAM with Control Data technology. Antonio Limongi Franca of the company asserts that the ICEM-Intergrad Computer Aided Engineering and Manufacturing software is all-encompassing and versatile, allowing the user "to take the first steps in this area with a simple design drafting unit and gradually growing into totally integrated solutions, without the need for high initial investments."

The line of services in the area of support for designs and manufacturing of the Villares Company in turn includes the generation of designs in the mechanical and civil areas, generation of CN programs for operating machines--its experience in this area comes from the fact that the Villares Group has more than 70 CN operating machines--design of parts, tools, devices and patterns; on-line use by the customer of the computers of the Villares organization for the generation of CN programs for operating machines; development of post-processors and advisory services in planning and use of CAD/CAE/CAM-CNC.

At its stand, Still S.A. of Sao Paulo is going to have an exhibit of posters, catalogues and pamphlets of imported MFL machines--Machines Francaises Lourdes and its branches, Forest-Line (including an FMS of this make) and Berthiez Saint-Etienne, which makes equipment for heavy lathing and vertical correction, and Goldsworthy Engineering.

CTL Informatica Ltda., of Sao Paulo (SP), according to Ricardo W. Gonzales, is promoting its CNC CTL-3001 with alphabet-numerical keyboard, incorporating specific operation keys, high resolution 12-inch video, optional integrated PC and a modular system that allows the inclusion and replacement of boards.

"The hardware is implemented by means of modules in a "Multibus" bar terminal system pattern IEEE-796, allowing the simultaneous operation of up to eight control spindles controlled by a 16-bit computer and with a dedicated arithmetic co-processor," explained Gonzales. He also said that by means of software it is possible to control robots, milling machines, lathes and various machine-tools that work simultaneously with various spindles, making linear, circular, helicoidal, spline and spiral interpolations.

The use of a simple key projects a list of procedures to be following in the execution of a program on the screen of the CTL-3001, concluded Gonzales, who is also taking to the exposition a CNT 4604 reader/perforator unit and the CTL 4002 and 4001 paper tape reading units.

It is also worth indicating another CTL product--the CTL-5002 bar code reader developed by the company to satisfy the needs of on-line data entry. The data are read by means of an optical pen and transmitted to the computer system via serial interface. By means of a 32 alphabetical-numerical character display, the coded information read, or the instructions transmitted by the user's computer system, are made visual. Its internal memory permits the storage of up to 128 characters before they are transmitted.

Supergauss Produtos Magneticos of Sao Paulo (SP), which a long time ago established itself in the market of permanent, anisotropic ferrite magnets, recently began to manufacture servomotors especially developed for the activation of CN machines and it is precisely this product that it is showing at the show.

Jose Candelora of Supergauss declares that the Supertorque, as the servomotor is called, is a strong piece of equipment with high reliability, built pursuant to international IEC, SMMA and DIN standards. Actually, it is an entire line of direct current servomotors with permanent magnets, which have an integrated tachogenerator and allow the precise coupling of position indicator devices.

The Supertorq servomotor has a small diameter (with a low moment of inertia) and makes possible fast approaches, precise positioning and instantaneous outputs during the operational cycle of high productivity machines.

Industrias Nardina S.A., of Americana (SP), will show informative materials, posters and video displays of the lathes it manufactures--the Turn-Tru and Segaz line--all numerically controlled, in addition to the CNC S/E line and Frontal TFN CNC.

The Turn-Tru line consists of two models, the TT-125 GP and the TT-125-GPR, with CN's and MCS. The main characteristics are: memory for 500 steps; headstock with the possibility of 16 speeds in geometric progression; longitudinal and transversal spindles with recirculating and preloaded spheres; antifriction materials for the movement of tables, whose movement is accomplished by direct current servomotors; and guides and adjusting screws with manual centralized lubrication. Those characteristics are followed, basically, in the Sagaz line also, except in the speeds of the headstock which in this case number 18, also in geometric progression.

The CNC S/E and Frontal TFN CNC lines use the Maxitec numerical control (the Sinumerik 3T, Model A, with microprocessors). It has an 8,000 character memory for a program library, subroutines and corrections; its main drive is a direct current motor, which allows constant cutoff speeds; the bar terminal system is special, with fixed male terminals and tempered and rectified constant cutoff guides; and the tool-bearing turret is automatic with four positions for the use of up to eight tools.

MCS Engineering Ltda., of Sao Paul (SP), according to Conrado Montineri Jr., of the company, is going to use several items to demonstrate its products, since its manufacturing line is somewhat extensive and the size of its stand is not enough for showing it completely.

"In general lines, the company presents its 100/200, 202, 210, and 300 CNC's plus the PAC 100, which is a cam simulator, and the RT, a rotating transducer," he summed up quickly. The CNC300 is used in milling machines, reamers, and milling centers, while the CNC-210 is specifically for lathes, the CNC 100/200 is for modular machines and the CNC 202 for rotating presses and shears.



The PAC-100 is a programable electronic drive with 16 outputs and a resolution of 1 degree or 0.01 mm, which can simultaneously store 32 different drive programs. The RT rotating transducer is of the incremental optical type with the following characteristics: 5 or 15 volts DC; outs of 0 and 90 degrees TTL compatible; and number of pulses from 25 to 125, allowing the possibility of obtaining 50, 60, 100, 120, 180, 200, 250, 360 and 500 pulses also.

"We are going to be at EXPOCON with some of our products and also revealing our training service in the areas of CN and programable controls," reported Thomas Lanz, president of SOBRACON and superintendent of Maxitec S.A., of Sao Paulo (SP).

Among the products, a CNC with colored display, a communications network, a monochromatic video display CNC and the Progmax system, will be emphasized.

Progmax is a 2D assisted programing system developed to facilitate programing of CNC machines with an editor, automatic generation of profiles, simulation and transmission of data (DNC). The profile of the part is determined interactively by the user and the more complex forms are established on the basis of basic geometric spots defined in the system as segments of straight lines and arcs of circumference. With this information, the system generates the program in CN language, going on then to the following phases (editing, automatic generation of profiles, simulation and transmission of data).

There is a vast range of equipment for industrial automation in the Maxitec line, such as Sinumerik 3 and 3A CNC's, the MXT 3001, 130 (PID control by software), 110 and 130 programable controls with intrinsic safety, and the MXT 1001 programable mincontroller.

Jaime Trindade Nunes Calado, manager of the Proceda Tecnologia S.A. branch in Sao Paulo, pointed out the activity of the company in three sectors of the market: Services in the area of data processing, industrial automation and the manufacture and sales of equipment. "Naturally we are placing our systems in the area of industrial automation in evidence at EXPOCON, with special emphasis on Edite," he said.

According to him, this is "the first software developed in Brazil for the programing of machine tools and it was launched in 1984, precisely during the First EXPOCON." Calado also pointed out that in this line "the Edite is the most complete system in Brazil, involving the editor of preprogram and macros, graphic simulator, communications in DNC, mathematical support and checking of syntax." He also said that the system was developed for Proceda by the Federal University of Santa Catarina.

The company will also show an automatic weighing system, which can be used in processes or in the area of control, and it allows connection to centralized data processing systems.

Sucesu/SP--Society of Computer and Subsidiary Equipment Users (SP)--is going to be publicizing the event "Sucesu/87," that is going to be held from 31 August to 6 September next year. The event will have "Data Processing for All" as a theme and will consist of the VII International Data Processing Fair and the XX National Data Processing Congress.

The body also reported that it recently inaugurated its "showroom," which is equipped with a number of pieces of national equipment by means of which the potential of several softwares offered on the market will be tested.

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CSO: 3699/31

## LATIN AMERICA/FACTORY AUTOMATION

### STATE OF CAD/CAM IN BRAZIL

Sao Paulo NOVA ELETRONICA in Portuguese Apr 86 pp 72-78

[Article by Jose Americo Dias: "Industrial Automation: On the Way to 'Dedicated Industry'"]

[Text] The mass production factory based on the work of thousands of machines and workers will definitively go to the junk yard. Transformed by the introduction of electronics and digital systems, machines should acquire a degree of automation capable of surprising even the most daring of science fiction writers. The mass of workers will be replaced by a small number of highly qualified engineers and technicians, whose work is going to be restricted to pushing a few buttons and to handling the language of informatics. From marketing plans to the conception of projects, and even their final preparation, everything, in short, will pass on to the control by intelligent systems, which provided with knowledge accumulating cells, will have the capability of making decisions and resolving problems. Beyond the few tasks in the new type of factory that is making an appearance, only a few functions in the service sector will remain for men. By accepting changes in the productive structure by means of simple modifications in software, the new factory will attain the height of flexibility. We will enter the era of "dedicated production": The consumers will be able to specify the characteristics they wish to see in a product before buying it.

Setting aside the dramatic social problem of relocating the mass of workers replaced by machines to other activities, the new industrial model will allow the attainment of the apogee of the consumer society. The consumer dreams of human beings will be made a reality in a very short time and at a lower cost, since industrial installations are going to register very high levels of productivity because of the elimination of errors and idle times of the "old machines" controlled by men of flesh and blood. Moreover, since they would be limited to changes in software, changes in production lines would cost much less than today when entire factories need to be remodeled to satisfy a new demand of the market.

What has been said up to now is much more than a mere exercise in futurology. It is a projection based on a paper by Professor Hermann Roherer, technology manager for Mentat, a national producer of robots, presented last year at the Robotics Symposium of SOBRACON--the Brazilian Society of Numerical Controls--in Sao Paulo. Professor Roherer, in turn, bases himself on a talk by West German G. Spur, given at the opening of the International Conference on Production Techniques held in Berlin in October 1983. While at the time of this event the forecasts by Spur may have given the impression of being exaggerated, today they sound perfectly feasible, even for Brazilian executives, who late last year attended the presentation by Professor Roherer at the Robotics Symposium. Automation of industrial processes based on digital technology, has expanded rapidly in the last 3 years, and what was a trend, or "a Japanese thing," is already materializing, to the surprise of the unbelievers, into the great industrial corporations of western developed countries. Automation is developing horizontally, but the main beneficiary of this advance has been its advanced sector represented by the CAD/CAM processes, machines with numerical controls, programmable logical controllers and robots. The rise in production levels by means of electronic control of industrial processes (another important field of automation), satisfied the demands of the 70's but was incapable of repeating the dosage in a period marked by a fierce competition between American and Japanese industries. It was precisely through the intensive application of CAD/CAM processes and the installation of flexible production cells with numerical controls and robots that the Japanese managed the feat of removing the Americans from the pole position in the automobile world market in 1985. The undeniable leader in the first phase of industrial automation, supported by systems addressing a single line of scale production, the American automobile industry lost the race in the manufacture of robots and other equipment that make up the pillars of modern automation. How can they compete with plants, which anticipating the future, are already capable of rapidly modifying their installations for the manufacture of automobiles or the manufacture of trucks depending on the demands of the market; and who when producing for an order can introduce, even in small lots, specifications to the liking of the customer? In short, they are plants in which almost everything is automated, from quality control to internal transportation systems, and which because of that can give themselves the luxury of working with small stocks, saving on physical space and in working capital.

It appears that the Japanese will win the first leg of the industrial automation race. They have been flashily exhibiting their success in the technological expositions they held during the last period, attracting the attention of technicians and executives of the entire world. In one of those exhibits last year in Tsukuba, to the despair of their rivals, they showed some examples of their third generation robots--flexible, precise and with advanced systems for sensing working conditions.

However, considering the technological and financial capacity of their American and European competitors, the Japanese do not have their hegemony assured for very long. The reason for this could be the fact that their growth shows a great dependence on the American consumer market, access to

which could be made difficult at any time by protectionist measures, or because of the volume of investments being made by the United States in research and development of new technologies (1.5 percent of its gigantic GNP, not including military spending).

The battle for supremacy in industrial automation, particularly manufacturing automation, becomes confused with the struggle for domination of the world market of industrial goods. Within a few years there will be no way that competitive products can be imagined without increases in quality and productivity brought about by the application of digital technology. The consolidation of this trend will force countries such as Brazil, for example --which even though they do not seek to compete for a position of leadership, depend on a share of the international market for making their economy function--to mandatorily join in the marathon of automation also.

#### Difficult Apprenticeship

The new technologies of industrial automation arrived in the country in the decade of the 70's, primarily through the imports of numerical control machines, programmable logic controllers and equipment for the control of processes. Despite the interest aroused by the new machines in a group of companies that made up the vanguard of the national industry--linked to the automobile, electric-electronic, steel and iron and petrochemical sectors--the initial rate of its implantation was slow. The case of numerical controllers is particularly illustrative of this reality: In a period of 8 years, 1973 to 1980, the Brazilian market installed only 478 machines. In addition to sluggishness, this process revealed distortions originating from the wrong information on the application of numerical controls. Because they disdained making feasibility studies as to the model or size of the machine most suited, many user companies committed errors in their purchases, which led to serious harm to yields and maintenance difficulties.

Romi, itself, today the largest national manufacturer of computerized numerically controlled machine tools, made that mistake, purchasing for its use no fewer than 17 different imported types. "The error brought us so many problems that it turned out to be beneficial because of the know-how we acquired in resolving them," comments Ferdinando La Fortezza, director of the electronics division of the company. Obviously, the positive effects mentioned by the Romi executive cannot be applied to the majority of the users of numerical controls who committed the same error. For them, who did not see themselves become manufacturers like Romi, the results were somewhat discouraging: instead of a solution, numerical controls brought new problems. Therefore, they took the easiest way out: Many of those companies "shelved" their machines or went on to use them at a level below that allowed by their potential.

Difficulties with numerical controls--and also with other equipment for automation of manufacturing processes, such as programmable logic controllers--continue today. They cannot be overcome by means of simplistic solutions because their origins reside in the resistance shown by national industry to the assimilation of the concept of automation in its totality. This means

not only the installation of machinery, but also the adoption of parallel measures such as interconnection with other machines and automation of the flow of parts in their unfinished and finished state, tools and auxiliary materials (devices, cutting compounds, patterns, and so forth).

According to a survey made by the Regional Department of SENAI [National Service for Industrial Apprenticeship] of Sao Paulo at the end of 1984, which covered a group of 19 Sao Paulo companies using numerical controls, the predominant tendency is still that of isolated applications. This means that more than half of the companies surveyed use no other microelectronic devices than numerical controls in their productive processes. Changes in plants, lay-outs and organization of production are also very uncommon, since the majority of the companies limit their preparation for reception of machines to the training of personnel who are going to operate them. The painful road of numerical controls in Brazil has its counterpart, in a lesser degree due to its lower level of complexity, in the history of application of the programmable logic controller, another important piece of equipment in manufacturing automation. According to Renato Ottone of Digicon, one of its manufacturers in Brazil, the controller is still greatly used simply as a substitute for relay panels, when it could be used optimally, in applications of control in the positioning of shafts or to complement elements of instrumentation.

The picture of a Via Crucis is certainly exaggerated in describing the implantation of process control systems by national industry. This does not mean, however, that the sector is living in a bed of roses. Sold in packages, whose installation is the sole responsibility of an assembling entity which may or may not be the manufacturer of the equipment, the process control system generally does not present failures in application. However, due to improper information, it continues to remain outside the sphere of planning by thousands of small and medium businessmen, who confuse it with a resource meant exclusively for the large industrial complexes. Adelmo Pilger, manager of automation and process control of the Sisco Company, reports that a survey made by the State Secretariat of Industry, Commerce and Technology "confirmed that most of the small and medium companies of Sao Paulo do not even know about process control." However, according to Pilger, the same survey concluded that for 25 percent of those companies the adoption of process control systems would bring economic advantages.

#### Prspects

The "lack of effort" by national industry in the assimilation of new automation technologies, undeniably reveals that Brazil is in its infancy in a sector of great strategic importance. However, for the majority of executives, our hesitancy is natural, since we live in a period of apprenticeship of a complex and revolutionary technology. "Japan and the United States also faced problems similar to ours when they were beginning," argues Ferdinando La Fortezza of the Romi Company.

To the argument by La Fortezza, we can add several others that allow us to see favorable prospects for industrial automation in Brazil. One of them is the uninterrupted growth of the Brazilian market in the last 4 years despite the economic recession. In the sector of numerical controls, for example, the use of machines, which in 1982 was approximately 150, rose to 180 in 1983, to 306 in 1984 and the forecast was that it would reach 473 in 1985 alone, according to Sobracon. This performance was also shown in other areas, including that of process control, which regardless of how incredible it may seem, was not affected, not even by the retraction of investments in the iron and steel and petrochemical sectors.

Although there are no consolidated statistical data, manufacturers and assemblers generally confirm that good performance. Leon Bujaker, sales manager in the area of process control of Elebra Telecon, points out that one of the characteristics of the sector is its relative immunity with respect to the ups and downs of the economy. "When there is a heating up of the economy, the companies invest and the process control field expands. However, if there is a recession, the market remains because the companies need to optimize their production." Bujaker's reasoning could be invalid for the small and medium companies, usually those most affected by an economic recession. However, for the large ones which deal with the foreign market and are the largest users of process controls, it applies perfectly.

There is another reason for believing in the future of industrial automation in Brazil: The accelerated rate at which the industrial park is producing equipment and systems. Its installation began, in the majority of cases, in 1981, when the Special Secretariat of Informatics (SEI) ordered the reservation of the market for national companies. The manufacturers were selected for each branch of equipment production and they were granted the authorization to import foreign technology, with the commitment to complete the process of nationally produced equipment in 5 years. That objective will be easily reached in 1986 by the four manufacturers of computerized numerical controls accredited initially by the SEI: Romi, CTL (formerly Cantelha), Maxitec and Digcon, which incidentally are already announcing the development of products of their own manufacture.

The same dynamism can be confirmed in programmable logic controls, a sector in which no fewer than 20 manufacturers are crowded, the majority with already nationally created technology.

With respect to equipment and systems for process control, there was also a veritable avalanche of companies that became involved in their manufacture. At this time there are no fewer than 15 involved in the production of industrial and process micros, and 14 of them in the production of distributed control digital systems (SDCD). The use of foreign technology (Yokogawa, Hitachi and Leedz, for example) is also common here in the manufacturing of systems for simple and multiple networks. However, there are already products with national technology, particularly systems that use controllers for simple networks.

The CAD (computer assisted Design) systems will also attract the interest of different manufacturers, who operating with their own technology (the small models) or imported, will begin to service the Brazilian market in the first half of 1986. At this time, CAM (Computer Assisted Manufacture) systems, because they are more complex, are not yet produced in Brazil. Similar enthusiasm was expressed by almost two dozen companies, which authorized by the SEI, became involved in the production of robotic systems. There is a considerable amount of national technology in this case also, developed on the basis of company/university partnerships, as in the case of the EB Projetos, which teamed up with the FDTE (a body of the University of Sao Paulo) for the construction of its orbital 600 robot. However, the race for placing the first products on the national market is being won by Villares and by Mentat (partnered with Varga and Mangels), which using imported technology--Hitachi and Siemens, respectively--have already presented their first robots made in Brazil.

We next present a picture of production of industrial automation equipment in Brazil, based on interviews held during February with some of the more representative manufacturers of the sector.

#### Numerical Controls

Romi is the major national producer of computerized numerical controls. Its peculiarity is that it is also the manufacturer of machine tools, which provides it with a captive market for its numerical controls. In 1985 its production was 145 machines. The forecast for this year is approximately 220 units. As has happened up to now, all of them will be installed in machine tools made by Romi itself. This is why the company initiated a plan for the expansion of its installations for the production of numerical controls, since as of 1987 it will have to honor a commitment with the SEI of providing no less than 20 percent of its production for third parties.

Romi makes the Mach-3 numerical control, which uses the American Allen-Brady technology. With a capability of controlling up to six spindles this machine is designed for applications of medium and large scope. "This model," explains Ferdinando La Fortezza, director of the electronics division of Romi, "presents an innovating concept at the design level, in addition to incorporating vanguard electronic components such as Intel 8086 microprocessors of 16 bits and the 8087 mathematical coprocessor."

Moreover, it has a video circuit that allows the numerical control to produce high resolution graphics which, among other things, allows viewing the point of a tool in the act of cutting a part. This circuit can use either a monochrome video or one with up to eight colors. The equipment has a built-in programable logic controller and is sold with all its peripherals--keyboards, I/O, videos, and so forth--and the basic and applicative software. Incidentally, the software sector is where the company intends to concentrate its efforts in the next period, convinced that the machines that offer the largest number of applications are going to predominate in the market.



The Digicon numerical control is the TX-8, with Mitsubishi technology for the control of up to six spindles. Although it was accredited by the SEI in 1981 and has already presented a pilot model at the Machine Fair of 1982, the company only began to produce for sales in the second half of 1985. Its production estimate for 1986 is approximately 150 machines, most of them for its preferred customer, Traubomatic, a producer of machine tools. Although it intends to maintain its present model, Digicon is engaged in the development of another numerical control model for use in smaller machines such as milling machines. "With the objective of lowering costs, we are going to seek to combine the experience in numerical controls with that of the micros existing in the market, adapting them for industrial use," promises Renato Ottens, director of the company.

CTL Informatica presents two models of numerical controls, the TNC 145 and the TNC 131, both with a capability for controlling up to three control shafts. They use Heidenhein technology, A German company specializing in small size applications in milling machines, reamers and boring machines. With an average production of approximately 50 machines per year, the CTL supplies a diversified group of machine tool manufacturers, among them Traubomatic and Romi.

Not interested in becoming specialized in supplying machines for small size applications, the CTL is preparing the launching in this first half of the year, of a new model, the CTL 3001. It will have the capability of controlling up to eight spindles. This is a very versatile machine with a high resolution video, which can control lathes, milling machines and a number of machine tools which work simultaneously on several spindles through the use of the proper software. "Despite the fact that we have had consultations abroad, the 3001 will be entirely national, with a technology developed by the CTL itself for both hardware and software," says Ricardo Gonzalez, the sales manager for the company.

#### Programable Logic Controllers

The Metal Leve company manufactures three versions of the same family of programable logic controllers, using the Allen-Bradly technology: The 2/15 model with 128 inputs and outputs and a 2 K memory; the 2/20 with 512 inputs and outputs and up to 8 K; and the 2/30 with 895 input and output terminals and up to 16 K of memory. The three pieces of equipment adopt the language of relays, have a modular structure to facilitate possible expansions, and are monitored in real time. The two versions which make up the majority were designed in such a way as to facilitate their connection in network with computers and other PLC's, forming a data highway (Integrated Communications Net). Through this network, it is possible to make interconnections of 64 stations (computers or PLC's) among each other at distances of up to 3,000 meters. "We feel that one of the tendencies of the Brazilian controller market is toward the acquisition of entire networks. That is why we concern ourselves with providing equipment with an input and output structure that is compatible for interconnection with other machines," explains Segio Mindlin, director superintendent of the company. Digicon

offers two basic models of controllers to the market: The CP/DIG-80 with 512 input or output terminals, and the D-20 with 40. Both were developed with own technology, using in their programing the language of relays, and they are monitored in real time. In the case of the CP/DIG 80, which has an EPROM memory for up to 4,000 instructions, interconnection in network with computers can be made by means of an RS232C interface. Digicon offers three basic peripherals for this controller: a programing briefcase, which allows the maintenance and monitoring of the equipment, a programmer monitor equipped with video and recorder of the EPROM, and a test unit.

The D-20, called a minicontroller, was put out by Digicon especially for replacing relay panels (of 5 to 70 units). It weighs only 1.5 kg and can be easily programed from its own folder of instructions. It uses an RAM memory for 320 programing steps and a terminal for monitoring in real time.

### Robotics

The Villares Company has just begun selling its first robot, the RV6060, a jointed model with facilities for six spindles and CC servo rotational activation. Its technology is exactly the same as that of a model put out by Hitachi last year in Japan for arc welding and assembly applications. Its load capacity is 6 kg at 200 mm from the center of the grip axis at 1m/s. With respect to its control system, the Villares robot uses the teaching playback method of apprenticeship, continuous track control by teaching of points, and a memory of the magnetic ball type with a capacity for a maximum of 1,000 programing steps (control of position and work conditions) and 2,000 work steps. In Manu operation, it uses systems of cylindrical or articulated Cartesian coordinates. It also has a sensing system for evaluating changes in work and for modifying software. Optionally, the robot can function in an integrated system of manufacturing automation by means of interfaces, which linked to outputs of its control unit, allowed "talking" with other similar machines or with computers and other local nets.

According to Jose Maria Monteiro Ribeiro, marketing and sales manager of the digital electronics division of the Villares company, "The company established a strategy for the sales of its robot that is tied to a general concept of automation of manufacturing and that is that it is not finished with the purchase of a single robot. Our objective is to sell a complete automation system, which may mean transformation in the way of producing and even the installation of other equipment. We want to sell a solution and not just one robot," he emphasizes.

The Mentat robot--Mentat is a company made up of the Varga and Maxitec companies--is another one that has just appeared on the Brazilian market. Developed on the basis of Siemens technology, the R3 is an articulated robot with a capacity of up to 15 kg of load, speeds of 2.5 m/s (in vertical movements it is faster than the linear robots) and a repetitiveness of 0.1mm. It is designed for a number of uses, among them the carrying of machine tools, assembly, arc welding, polishing, deburring and handling.

Designed as a flexible manufacturing cell, the R3 also provides possibilities of interconnection with peripheral equipment such as programable logic controllers, industrial micros, conveyor belts, indexed tables, and so forth.

In the opinion of Professor Hermann Roherer, manager of technology of Mentat, in addition to the operational advantages, the R3 has an important structural characteristic: Its motors are installed in the grab itself and not outside it, as in the majority of existing robots. "This is possible thanks to the technology they use, which protects them from wear and tear without the need for using brushes, allowing their construction in a smaller size," explains Professor Roherer.

#### Process Control

The activities of Eletrocontroles Villares in the area of process control involves the use of industrial micros of 8 bits (MOD-85) and 16 bits (Mod 86), process micros VDC-905 of 16 bits, the programable logic controller Vilologic-500 with 112 inputs and 88 outputs, and a serial data communications system (STU). The micros of the MOD family and the programable controller were developed with own technology by Villares, while the process micro and the STU use Hitachi technology. Considering itself much more an assembly plant than a manufacturer of equipment, Eletrocontroles also provides peripherals for process controls such as intelligent remotes for monitoring and control and a communication line with the protocol suitable for process control. In addition to that, the company is preparing to acquire equipment, that it does not produce, from third parties to be used in certain applications that may require them. In the software area, Eletrocontroles offers software which may be used in several industrial areas: iron and steel, metallurgy, petrochemical, electric power and naval.

According to Simao Capeliovitch, manager of the automation sector of the company, Eletrocontroles is also concerned with following the present trends of the market represented by the great industrial complexes--iron and steel in particular--which are expanding the degree of integration of their systems. As an example, he cites Consigua (Guanabara Iron and Steel) and what is being installed for the expansion and modification of its rolling mill for bars and angle beams. "Among other equipment of lesser importance, we are installing no fewer than 12 industrial micros (four of them made by Itautech), four programable logic controllers, two disc units and two printers," reports Capeliovitch.

Since its appearance in 1978, Sisco has been active in the process control area. But its star in the industrial sector rose in 1961 with the installation of a supervision and control center in the Companhia Brasileira de Cristal in Jacarei, Sao Paulo, for a production of sheet glass via the "float" process. This system was based on the MIC 1000 supervision and control unit--a piece of equipment for distributed processing with a modular structure and a 16 kB memory (RAM + EPROM), which was the spearhead of the company's activities in the market. In addition to the MIC 1000, the systems

provided by Sisco include a number of industrial micros of its own manufacture, which cover a range of from 8 bits to medium size, with the System 1000 minicomputer with 512 kB main memory.

Elebra Telecon operates in the area of process control with two basic families of equipment: that of the MAP micros, designed for supervision and control systems, and the MAX-SD, a distributed control digital system for typical industrial uses. The MAP micro has a modular structure to facilitate adaptations, depending on application needs, and comes accompanied with protocols for "talking" with the MAP Center responsible for the man/machine interface.

The SDCD of Elebra--MAX-SD--is basically made up of three subsystems: interface with the process (autonomous unit) responsible for the control of the closed network and the collection of data; man/machine interface, which creates the images for the operator on the status of the process, and the data communications link responsible for passing information between the subsystem interconnected to the process and the man/machine interface. "With those two families of equipment, we cover a considerable sector of the transformation industry market and also the sector of electrical energy and telecommunications," declares Leon Bujaker of Elebra.

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CSO: 3699/31

## LATIN AMERICA/FACTORY AUTOMATION

### BRAZILIAN R&D ON ROBOT MOTORS

Sao Paulo MAQUINAS E METAIS in Portuguese Jul 86 pp 40-43

[Text] One of the great concerns within the area of automation is about activation. There are several ways of activating a coordinates table, a robot or any other equipment and one of them is by means of stepper motors, which were invented a little more than 60 years ago.

The use of that device in Brazil has been extensive in the area of data processing, particularly in peripherals such as printers and disk drives, while in industrial automation there is still a relatively minor use of them, which is partially justified because of a certain lack of knowledge about stepper motors and because of a lack of local suppliers.

This picture, however, may undergo changes, since up to now there are four national manufacturers. The problem is that the majority of the motors still follow a concept of low torque, this also being one of the limiting factors in their use in automation.

One of the most representative of the stepper motor manufacturers for industrial automation is Syncro Eletromecanica Ltd., founded a little more than 3 years ago; its first product was put on the market almost a year and a half ago. It was a five-phase hybrid stepper motor with a small step angle.

The company was the idea of Mario Julio Spada, who died last year. He decided to start with the development of high resolution, high torque stepper motors. "He began with the most complicated thing, whose use is not so great, doing without the infrastructure for mass production at first," comments engineer Carlos Alberto Tsubake, director of the Syncro Company.

The idea seemed to have been that of producing motors for automation, creating the technological skill for producing other types of drives. At this time the company produces three basic types of stepper motors. In the line of five phase motors, there is one with a torque of 200 N.cm and 0.72 degrees of step angle, that is, 500 steps per rotation. By means of electronic controls it is possible to double the resolution of the motor by dividing the angle in half, thus providing 1,000 steps per rotation.

The second type of motor, also a five phase motor, is different in the amount of torque, which is 95 N.cm. It is worth mentioning that such motors have a very small error in positioning--a maximum of 5 degrees noncumulative per step. "We have the intention of developing motors with smaller resolutions with an angle of 1.8 degrees with the same amount of torque, since many applications have no need for a great deal of accuracy but they do need torque," says Tsubake.

The third model, produced a few months ago, has four phases and a torque of 45 N. cm and is designed mainly for covering the area of printers and perhaps other equipment for data processing. "We note that many companies of this sector are making stepper motors nationally as a way of using the funds required for importing them for importing other electronic components," he says.

Syncro encountered a number of difficulties in producing and developing the motors. One of them was that of obtaining funds, raw materials, magnets and microbearings. "We continue to import the bearings since no manufacturer is interested in producing small quantities," complains the director of the company. However, there are indications that the NSK is interested in producing this item nationally.

Stepper motors with high torque appear to be the main portion of the market that Suncro intends to compete for, since they contain high technology, according to Tsubake. "I believe that their use in automation can only increase if the technicians of the sector had greater information about stepper motors. The majority of them, perhaps because of their lack of knowledge about them, continue to use mechanical drives which not always provide the precision and efficiency required by the process," he said.

Their uses are innumerable, and include optical and photographic instruments, plotters, machine tools, process controls and small valves, digital instruments and systems and even robots. The problem in increasing the number of uses, as everything appears to indicate, is that same lack of knowledge noted even in the universities by Syncro personnel.

One which has been researching these devices for some years, appears to be the Engineering School of Sao Carlos [EESC], Sao Paulo. In 1982 the first research for making the motors nationally was begun. Some sample motors were provided by COBRA [Brazilian Computers and Systems, Inc.]. An agreement for the 1983/1984 period was then entered into between the EESC and FINEP [Funding Authority for Studies and Plans] for the development itself.

Starting with variable reluctance motors, hybrids were developed, however some problems were encountered in making them nationally. The main problem, according to Doctor-professor Otto Alfredo Rehder, director of the Precision Machining Center of the EESC, was with respect to the magnet to be used, since there was no ferrite with radial anisotropy in the country. Meanwhile, the Eriez Company signed a contract with the EESC for developing this type of magnet, which should be available by the end of this year.

Even with those problems, the first prototypes were produced, which aroused the interest of another company, Digimotor, also of Sao Carlos. By means of an agreement which included the payment of royalties, the company began industrial production of the nationally-built stepper motors that are designed for data processing purposes due to their low torque. Digimotor has already shown an interest in expanding its high torque line, however, it did not give any greater information as to how this will be done.

#### Native Invention

A new agreement was signed between the EESC and the Secretariat of Industry, Commerce, Science and Technology of the State of Sao Paulo with the objective of developing stepper motors with torque of above 100 N. cm. Several alternatives were researched until studies were begun with conventional three phase type induction motors.

The engineers disassembled the three phase motor and made a new winding for the stator which began to work with two phases in a bipolar system, which means that the current can be inverted. The rotor was completely changed, using the technology of permanent magnets. To create permanent poles in the rotor, several types of magnets may be used, however, research was also aimed at bringing down the price of the product, for which purpose ferrite was used, ferrite being 10 times cheaper than the AlNiCo [Aluminum, nickel, cobalt] alloy but with a magnetic density that is one-third as great.

As a way of overcoming that magnetic problem, it was sought to increase the area of contact of the permanent magnet. Therefore, the magnets were arranged radially instead of superficially or axially. Among the magnets, one made of soft iron was used--it does not become saturated magnetically--allowing the formation of poles to be attracted by the stator.

"In that way we obtained results very close to those of magnets of better quality, but with the problem of increasing inertia a small amount," explains Professor Rehder, who worked directly in the research. He believes that in this way the stepper motor can be made useful for many applications, particularly where a high torque becomes necessary.

One of the limitations of this development is the number of steps, which are established by the construction of a conventional motor. For example, if a commercial motor has 24 grooves in the stator, the motor will have 24 steps of 15 degrees each. A patent for the invention has already been applied for but a problem has arisen: There is the need to design a completely new motor or try to interest a manufacturer of commercial electric motors in producing those stepper motors.

"I cannot continue to use motor housings that do not belong to me, since the original design is not mine. As far as the rotor is concerned, there are no problems, since it was completely redesigned and does not require very expensive tools for its manufacture," explains Rehder. In terms of cost, the present method of transforming a conventional motor into a stepper motor would mean an increase of 50 percent over the cost of the original product.

Rehder questions certain statements that steps of less than 15 degrees are necessary. "Obviously, for many uses a high resolution stepper motor is important, however, in others, if the step is very small the speed falls to levels that compromise the yield in its use," he argues. He even advocates the use of the present device for activating a coordinates table, since it has a good speed, in addition to a high torque (the prototype reaches 200 N.cm). Meanwhile, studies appear not to have taken into consideration other limitations such as size, clearances and precision of drive.

Rehder's activities do not end there, however. He seeks to make contact with some conventional motor manufacturers to try to improve and make the invention practical. At the same time, he has studied electronic controls for the motor and, since in this particular case the results have not been positive, he will have to go to Lasertech to create cooperation in this area, "because that company is providing controls for Syncro," he commented.

The professor says: "Another of the problems is the adaptation of numerical control language to the control of the stepper motors, which means that it is important that the language used in the control of the motor be the same as that used industrially." The Brevet Company is collaborating in this research, donating an MDS numerical control, in addition to a small coordinates table to the EESC.

Another phase of studies that the school seeks to attain is the study of feedback for the stepper motor. The idea is to connect a sort of encoder to the motor with a view to providing feedback to the CNC. Even though some of these developments are very recent, some still even in the study phase, the Sao Carlos professor places himself at the disposal of interested companies for developing applications in automation.

#### Component for Data Processing

Low torque stepper motors are mainly used by the data processing industry and in small automations in printers, disk drives, electronic typewriters, copiers, telex terminals, and so forth. The Singer Company is at this time the major producer of this type of motor in the country and has been on the market for only a year.

"After almost 2 years of research at the technical and market levels, and with the approval of the Informatics Law, we believe the production of those motors in Brazil to be timely," said Antonio Wroblewski Filho, manager for industrial sales development of Singer. He says that in this area the risk of obsolescence of a product is very great and because of that there was the need to develop an own technology.

At this time Singer is mass producing a number of versions of stepper motors, but with two basic models: the BP, with 7.5 degree steps, and the SM with 1.8 degree steps. The first has sinterized bronze bearings, while the second one uses micro roller bearings. "We made contact with several national



companies but none of them up to now has shown an interest in producing those roller bearings, which justifies importing them," said Wrobleski.

"In terms of wires and some magnets it was possible to use those of local suppliers, but we need to make extensive studies on magnets before beginning production of the motors," says the manager of industrial sales development, who believes this is one of the greater problems of production. Specialization in magnets is due, in part, to the question of competitiveness, since ongoing discoveries may increase the yield of the motors and even reduce their cost of production.

One of the difficulties encountered by Singer is the scale of production. Despite the fact that these motors are produced in relatively large numbers, the Brazilian market is small and varied, which means there is a diversity of products that have the same function but with certain differences. This requires a change in the structure of Singer itself, which had to invest in its PCP, build assembly lines that were very flexible and install a laboratory for resolving the problems of the majority of its customers. Uses for the motors are studied in this laboratory. Through tests and discussions with the customer, a decision is made as to the best motor to be used, which usually turns out to be an offshoot of a basic model.

"Something very important is the training of technicians so that we may have a technical base capable of protecting us, since we intend to go into the foreign market," comments one of the Singer applications engineers, Marcos Antonio Azanha.

There are indications that the company has managed to reach costs that are competitive abroad, and naturally it is waiting for acceptance by customers before exporting. Initially the Brazilian product will be sold in Italy and the United States.

In April of this year, Singer of Brazil participated in the electric-electronics fair of Hanover and there were more countries interested over there, among them Belgium and Holland. Samples were already sent there and they are undergoing tests. Those operations should represent annual foreign credits of \$1 million.

Many national companies have made consultations only to confirm the practicality of the stepper motor in certain application, many of them not revealed to Singer. Some motors were also provided to research entities and centers for that same purpose. One of the areas being studied is robotics, however only in terms of experiments, since low torque motors are not suitable for those applications.

"Internally we are not researching anything in that type of application, but we could provide assistance to anyone interested in using stepper motors," explains Wrobleski.

Singer foresees a new item in coming months. It is a stepper motor with 200 steps per rotation and a torque of almost 50 N.cm. This motor should compete in the same area as the motor put out by Syncro, a four-phase motor with a torque of 42 N.cm.

#### Coastal Research

An engineer from COSIPA--Sao Paulo Iron and Steel Company--started the first experiments with stepper motors 3 years ago. His initial objective was research on automation and for that purpose he built a coordinates table that was to use those motors as a form of drive.

Without many resources, he built the first prototypes, which were of a very unstable form, with housings which had been turned on a lathe. During the 1983 Informatics Fair, he made contact with some companies which provided him with samples of imported motors.

His difficulties were also similar to those of the other manufacturers. "One of the greatest was with respect to test instruments, since they are dedicated," explains the former COSIPA official and today director of Autron Eletromecanica Ltda., Osvaldo Calvo Hernandez.

Starting with a schematic plan containing the theoretical development of the stepper motor provided by IBM, Hernandez began research for the construction of test equipment. With his own funds he managed to develop a completely national device capable of checking all the parameters of the motor in only 15 seconds.

"With those devices it was possible to speed up production itself, since the motors are checked one by one," he said. Production by Autron actually began a year ago after the development of the test equipment.

The director of the company, which is located in Sao Paulo, recalls that the Special Secretariat of Informatics had a very important role in the dissemination of his developments. The reason for this was that his motors use permanent magnets whose basic characteristics are a relatively low torque, good reliability, good cost/profit ratio and mass production.

The motors produced by Autron have steps of 7.5 and 1.8 degrees, torques that vary from 23 to 220 nM.m and sinterized bronze bearings. There is a range of options of flanges, output shafts and even in electrical characteristics such as voltage and current. Moreover, the company has gone into the electronic area, producing instruments for the control and checking of stepper and drive motors.

Its main customers produce peripherals for data processing, typewriters, telex terminals, biomedical equipment and instruments. According to Hernandez, the Brazilian market for stepper motors is promising, but is still dominated by imported products. "With the rise of the national industry in this sector, the large multinational companies that produce stepper motors

should install themselves in Brazil. Therefore, it is vital for the national companies to have a higher quality and a competitive price in order to survive," said the Autron director.

He shows a certain concern about this possible installation of multinationals of the sector in the country, however, he does not reveal the sources of that information or the names of the companies. However, he appears convinced that it could happen shortly and only says that it will be a Japanese company.

#### State Neglect

It can be assumed that Brazil is no fewer than 10 years behind in terms of stepper motors; the problem is not technology but development. Exactly 10 years ago, the IPT--Institute of Technological Research--of Sao Paulo developed the first national prototype and as of that time the technicians interested in technologically qualifying Brazilian companies sought financial support for continuing their research. However, it was only in 1983 that that plan obtained approval and the first funds.

Because of the delay, as well as because of salary problems, the stepper motor team of the IPT broke up and private enterprise assimilated the technicians. Thus, the project began to decline, particularly its rate of progress. After a number of considerations, funds were released by the Institute's Directorate for the contracting of some technicians to carry the project forward.

This team was put together a little more than a month ago and it intends to devote itself not only to the development of stepper motors, but also to that of servo motors and other transducers. The fact that the team can only obtain support now due to the accelerated growth of data processing and automation in the country, is obvious.

One of the main objectives of the group is that of developing methods for designing and manufacturing stepper motors, particularly those with a high torque, and to place them at the disposal of the industry, according to Paulo Evaristo da Silva Chaves, chief of the electronics group of the IPT.

The new team is reevaluating the objectives of the project, but is already completing a second prototype with a step of 1.8 degrees and a torque of 15 N.cm. The area in which they are a little more advanced is that of magnetic alloys such as those of neodymium-iron-boron, samarium-cobalt and aluminum-nickel-cobalt. Only a redefinition of the team's priorities will make it possible to have a clear idea of the help the IPT may be able to provide to this sector. Something about which there is no doubt is that it could have been much greater 10 years ago if it had not been for state neglect of research in the country.

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